emergency

MEDUMAT Standard²

Ventilator

Instructions for use

WEINMANN
medical technology

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1 Introduction

1.1 Intended use

MEDUMAT Standard^2 is an automatic oxygen emergency ventilator with functions for the monitoring of respiratory values. MEDUMAT Standard^2 is used in the treatment of infants, children and adults where spontaneous respiration has failed or is inadequate. The device can be used for invasive and non-invasive ventilation. MEDUMAT Standard^2 features ventilation modes for controlled, assisted, and manual ventilation. In addition, the device also enables oxygen inhalation and preoxygenation. With volume-controlled ventilation, ventilation volumes from 50 ml are possible. The device is not suitable for the ventilation of neonates.

Emergency applications:

- For resuscitation at the scene of an emergency
- For longer-term use in continuing emergency situations
- For the supportive induction of anesthesia (TIVA: total intravenous anesthesia)

Applications during transportation:

- In ground, sea and air emergency medical service
- Between hospital rooms and departments
- Between a hospital and other locations (secondary transport)

MEDUMAT Standard^2 is also suitable for gentle ventilation of anesthetized patients (TIVA: total intravenous anesthesia).

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1.2 Operator and user qualification

MEDUMAT Standard^2 must only be used by persons who possess a medical qualification and have received training in ventilation techniques.

As the operator or user, you must be fully familiar with the correct operation of this medical device. Observe the statutory requirements for operation and use (in Germany, particularly the German regulations governing owners/operators of medical devices (MPBetreibV)).
General recommendation: You should seek instruction on the correct handling, use and operation of this medical device from a person authorized by WEINMANN Emergency.

1.3 Contraindications

Possible contraindications for ventilation include:

- High risk of a barotrauma
- Pneumothorax or pneumomediastinum

1.4 Side effects

Possible side effects of ventilation are:

- Atrophy of the respiratory muscles
- Drying out of the airways
- Gastrointestinal air insufflation in the case of mask ventilation

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2 Safety

2.1 Safety information

Read these instructions for use carefully. They form part of the devices described, and must be available at all times.

Use the device for the designated purpose only (see "1.1 Intended use", page 5).

For your own safety as well as that of your patients, and in accordance with the requirements of Directive 93/42/EEC, please observe the following safety instructions:

2.1.1 How to use the device

Warning **Risk of poisoning if the device is used in a toxic atmosphere!**
If the device is used in a toxic atmosphere, it can suck in toxic gases from the ambient air. These toxic gases may reach the lungs of the patient and poison them.
⇒ Do not use the device in a toxic atmosphere.

Risk of infection if the device is used in a contaminated atmosphere!
If the device is used in a contaminated atmosphere, it may suck in contaminated or infected ambient air and harm the patient.
⇒ Do not operate the device in a contaminated atmosphere.

Risk of injury if the device is used in a dusty atmosphere!
If the device is used in a dusty atmosphere, it can suck in dust and contaminants from the ambient air. Dust and contaminants may reach the lungs of the patient and harm them.
⇒ Only operate the device with a device input filter.
⇒ Change the device input filter following operation in a very dusty atmosphere.

Risk of explosion if the device is used in explosive atmospheres!
Flammable gases and anesthetics may cause spontaneous explosions and thereby bring about injury to the patient, user and bystanders.
⇒ Do not use the device in combination with flammable gases or anesthetic gases.

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Risk of injury due to infected device!

An infected device or infected device input filter may transmit infections to the next patient and harm them.

⇒ Replace the device input filter after each transportation in an infected patient in Air Mix mode.

⇒ Only operate the device with a device input filter.

⇒ Check the device input filter before use and replace it if necessary.

Risk of injury due to device or component malfunction!

A damaged device or damaged components may result in injury to the patient, user or bystanders.

⇒ Only operate the device and components if they are externally undamaged.

⇒ Only operate the device and components if the function check has been successfully completed.

⇒ Only operate the device if the display is functional.

⇒ Keep an alternative ventilation unit at the ready.

Risk of injury if the pneumatic connections within the device are blocked or displaced!

When oxygen is supplied via a central gas connection (CGC) which has not been properly cleaned or is moist, the pneumatic connections within the device may become blocked by contaminants or particles or suck in moisture.

⇒ Only operate the device from central gas connections which are clean and dry.

Risk of injury in the event of device failure resulting from blocked suction inlets on the device input filter!

Blocked suction inlets on the device input filter may cause injury to the patient in the event of device failure as a result of excessively high pressures, and may prevent the patient from breathing on his/her own.

⇒ Always keep the suction inlets on the device input filter clear.

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Risk of injury due to sparks during defibrillation in the presence of oxygen and combustible materials!
In the event that a ventilator and defibrillator are used at the same time, defibrillation in an oxygen-enriched atmosphere and in the presence of combustible materials (e.g., textiles) combined with sparks generated by the defibrillation may cause explosions and fire, which may result in injury to the patient, user or bystanders.
⇒ During defibrillation, only use adhesive electrodes or ensure that the oxygen-air mixture coming from the exhalation valve flows away from the torso of the patient.

Risk of injury due to concealed alarm!
A concealed alarm light, loudspeaker and display will prevent the user from noticing any alarms and reacting to dangerous situations. This may result in injury to the patient.
⇒ Always keep the alarm (alarm light, loudspeaker and display) free.
⇒ Do not operate the device in a closed bag.

Risk of injury if an incorrect volume is applied in hyperbaric environments!
Use of the device in hyperbaric environments (pressure chambers) leads to the application of incorrect volumes and may result in an injury to the patient.
⇒ Do not use the device in hyperbaric environments.

Risk of injury if the device is operated outside of the prescribed ambient conditions!
Use of the device outside of the prescribed ambient conditions may mean that tolerances are not adhered to and result in device failure and injury to the patient.
⇒ Only operate the device within the prescribed ambient conditions (see "12.1.1 Technical data on device", page 121).

Risk of injury due to reuse of disposable items!
Disposable items are intended for single use. Disposable items which are reused may be contaminated and/or impaired in their function and therefore cause injury to the patient.
⇒ Do not reuse disposable items.

Caution **Risk of injury through electric shock if the device is touched!**
Accessories which are connected to the device may cause an electric potential in the device. This may lead to an electric shock on contact with the device and result in injury to the user.
⇒ Only use accessories from WEINMANN Emergency.

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Risk of injury as a result of pressure variations during use in combination with devices from the WEINMANN Emergency MODUL range!

If the device is used together with devices from the WEINMANN Emergency MODUL range, the flow used by devices from the WEINMANN Emergency MODUL series may cause pressure variations in the device.

⇒ Only use the device and devices from the WEINMANN Emergency MODUL range in combinations approved by WEINMANN Emergency.

Delay in treatment due to interference caused by electric and magnetic fields!

Electric and magnetic fields may interfere with device functioning, and delay treatment.

⇒ Maintain separation distances between the device and mobile telephones, radio units and X-ray apparatus.

Notice **Damage to the device caused by ingress of liquids!**

The device is rated IP54 (splash-proof). This only takes effect when the battery is located in the battery compartment. Ingress of liquids may damage the device, components and accessories.

⇒ Do not immerse the device, components or accessories in liquids.

⇒ Clean the battery compartment carefully so that no liquids enter the device.

2.1.2 Power supply

Warning **Risk of injury due to missing, flat or defective battery!**

A missing, flat or defective battery prevents treatment.

⇒ Only operate the device with a charged battery.

⇒ Keep an alternative ventilation unit at the ready.

Treatment prevented by defective power cord or power supply!

A defective power cord or power supply prevents the battery in the device from charging and thus impairs the operational readiness of the device.

⇒ Inspect the power cord and power supply regularly.

⇒ Only operate the device with a charged battery.

⇒ Keep an alternative ventilation unit at the ready.

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Risk of injury due to electric shock when connecting an incorrect power supply to the line power!
The power supply contains a safety device to prevent electric shock. The use of a non-original power supply may result in injury to the user.
⇒ Only operate the device on line power using the power supply recommended by WEINMANN Emergency.

Caution **Risk of injury through electric shock if the contacts in the battery compartment are touched!**
The contacts in the battery compartment are live.
Touching the contacts may cause injury.
⇒ Do not touch the contacts in the battery compartment.

2.1.3 How to use the patient hose system

Warning **Risk of injury due to contaminated or infected patient hose system!**
A patient hose system which is contaminated or infected as a result of hygienic preparation not being performed or being performed incorrectly may transmit contamination or infections to the next patient and harm them.
⇒ Do not reprepare disposable hose systems.
⇒ Perform the hygienic preparation of reusable hose systems correctly (see "7.3 Hygienic preparation of the device", page 93).

2.1.4 Ventilation

Warning **Risk of injury due to lack of patient monitoring!**
If the patient is not supervised during ventilation, delayed responses of medical personnel to alarms and error messages may result in serious injuries to the patient.
⇒ Always monitor patients during ventilation.
⇒ Be sure to react immediately to alarms and error messages as well as a deterioration in the condition of the patient.

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Risk of poisoning due to an overly high concentration of oxygen during ventilation!

Highly concentrated oxygen can have a toxic effect on the patient if administered for too long and depending on the age of the patient.

⇒ Do not use highly concentrated oxygen on a patient for too long during ventilation.

⇒ Adapt oxygen administration according to the age of the patient.

Risk of injury due to airway pressures which are excessively high or too low!

Airway pressures which are excessively high or too low may result in injury to the patient.

⇒ Check that ventilation is being carried out correctly using the gauge shown on the display.

⇒ Adjust the pressure limitation (P_{max}) to suit the connected patient.

Caution **Risk of injury due to operation of the device with compressed air!**

During operation with compressed air, the volume delivered by the device is excessively high and the oxygen concentration of the output is too low. This may lead to volutrauma and hypoxia in the patient.

⇒ Only operate the device with medical oxygen.

Risk of injury due to drying out of the airways!

Prolonged ventilation using the device may dry out the airways of the patient and cause them an injury.

⇒ Do not use the device for long-term ventilation.

Risk of injury if the patient valve is covered!

The patient valve may be covered due to the position of the patient and prevented from functioning properly.

⇒ Always keep the patient valve clear.

Risk of injury if dead space is not taken into consideration!

The patient hose systems for the device have different dead spaces. Failure to take dead space into consideration may lead to insufficient ventilation, especially in the ventilation of infants with very small tidal volumes.

⇒ Take dead space into consideration when choosing the ventilation parameters.

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2.1.5 Safe handling of oxygen

Warning **Risk of fire if oxygen is used in combination with combustible substances!**

The combination of oxygen and combustible substances may lead to spontaneous explosions. Where ventilation is inadequate, oxygen may build up in the environment (e.g., clothing, hair, bed linen) and cause fires and thereby injuries to the patient, user and bystanders.

⇒ Do not smoke.
⇒ Do not use open flames.
⇒ Ensure adequate ventilation.
⇒ Keep the device and screwed unions free from oil and grease.
⇒ Always close the SD card cover again following the insertion and removal of the SD card.

Risk of injury if oxygen escapes from damaged oxygen cylinders or pressure reducers!

Oxygen can escape unchecked from damaged oxygen cylinders or pressure reducers. This may lead to explosions and cause injury to the patient, user and bystanders.

⇒ Tighten all screwed unions on the oxygen cylinder and on the pressure reducer by hand only.
⇒ Secure the oxygen cylinder so that it cannot fall over.

Risk of fire due to inadequate ventilation in an oxygen-enriched environment!

Where ventilation is inadequate, oxygen may build up in the environment and cause fires. This may result in injury to the patient, user and bystanders.

⇒ Make provisions for adequate ventilation.

Risk of injury due to empty oxygen cylinder!

An empty oxygen cylinder prevents ventilation and may cause injury to the patient.

⇒ Keep a full oxygen cylinder at the ready.
⇒ Keep an alternative ventilation unit at the ready.

Notice **Damage to the device due to corrosion!**

Moist ambient air may enter oxygen cylinders which have been completely emptied and cause corrosion.

⇒ Do not empty oxygen cylinders completely.

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Damage to the device due to pressure hammer on fittings!
Opening the valve on the oxygen cylinder too quickly may lead to pressure hammer on the fittings.
⇒ Always open the valve of the oxygen cylinder slowly.

2.2 General instructions

- If third-party items are used, malfunctions may occur and fitness for use may be restricted. Biocompatibility requirements may also not be met. Please note that in such cases, any warranty claim and liability will be voided if neither the accessories recommended in the instructions for use nor genuine replacement parts are used. Third-party items may increase the radiation output or reduce the interference immunity.
- Repairs, servicing and maintenance should only be carried out by the manufacturer, WEINMANN Emergency, or by a technician expressly authorized by WEINMANN Emergency.
- Only have modifications to the unit carried out by the manufacturer, WEINMANN Emergency, or by a technician expressly authorized by WEINMANN Emergency.
- Any constructive changes made to the device may put the patient and the user at risk and are not permitted.
- The device is protected against unauthorized access by means of a colored security seal on the rear of the housing. Please note that any damage to the security seal voids any warranty claims.
- Please observe the section on hygienic preparation (see chapter "Hygienic preparation") in order to avoid infection or bacterial contamination.
- Also observe the respective instructions for use for the device, the components, and the accessories.
- Always carry out a function check before using the device (see "8 Function check", page 98).

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2.3 Warnings in this document

Warnings are used to flag up safety-relevant information.

You will find a warning preceding any action that entails a hazard for persons or equipment.

Warnings consist of

- the warning symbol (pictogram),
- a signal word designating the hazard level,
- information about the hazard, and
- instructions for avoiding the hazard.

The warnings appear in three hazard levels depending on the degree of danger:

⚠ DANGER	**Danger!** Designates an extremely dangerous situation. Failure to observe this warning will lead to serious, irreversible injury or death.
⚠ WARNING	**Warning!** Designates an extremely dangerous situation. Failure to observe this warning may lead to serious, irreversible or fatal injury.
⚠ CAUTION	**Caution!** Designates a dangerous situation. Failure to observe this warning may lead to minor or moderately serious injury.
NOTICE	**Notice!** Indicates a hazardous situation. Failure to observe this warning may lead to damage to equipment.
i	Designates useful information relating to a particular action.

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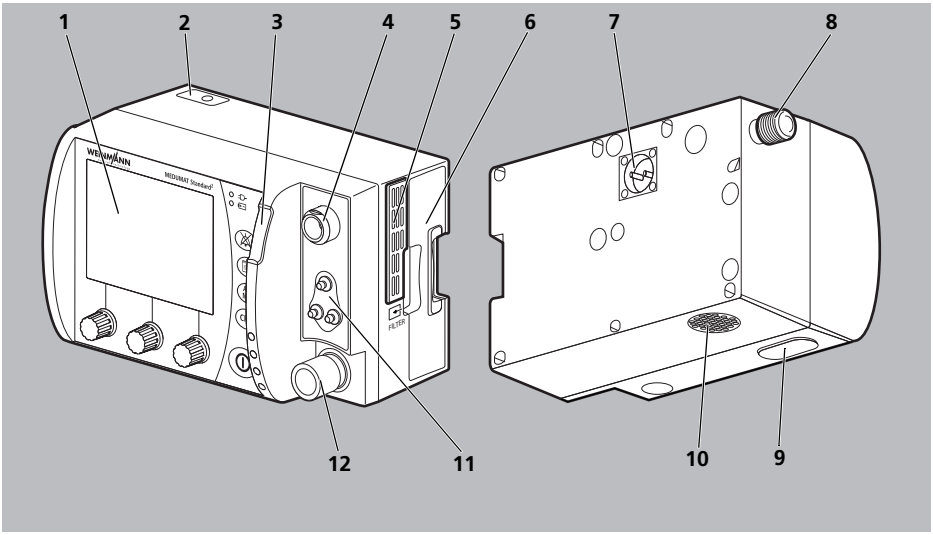
3 Description

3.1 Overview



3-1 Device

No.	Designation	Description
1	Display	Displays settings and current values (see "3.4 Symbols on the display", page 20).
2	Service cover	Used for servicing purposes. May only be opened by the manufacturer or persons authorized by the manufacturer.
3	Alarm light	Indicates high-priority alarms visually.
4	Connection for MEDUtrigger	Connects the device to the MEDUtrigger.
5	Filter compartment with device input filter	Houses the device input filter.
6	Battery compartment with battery	Houses the battery.
7	Power connection	Connects the device to the power supply.
8	Compressed gas connection	Used for connecting the oxygen supply (e.g., an oxygen cylinder).
9	SD card slot	For inserting an SD card.

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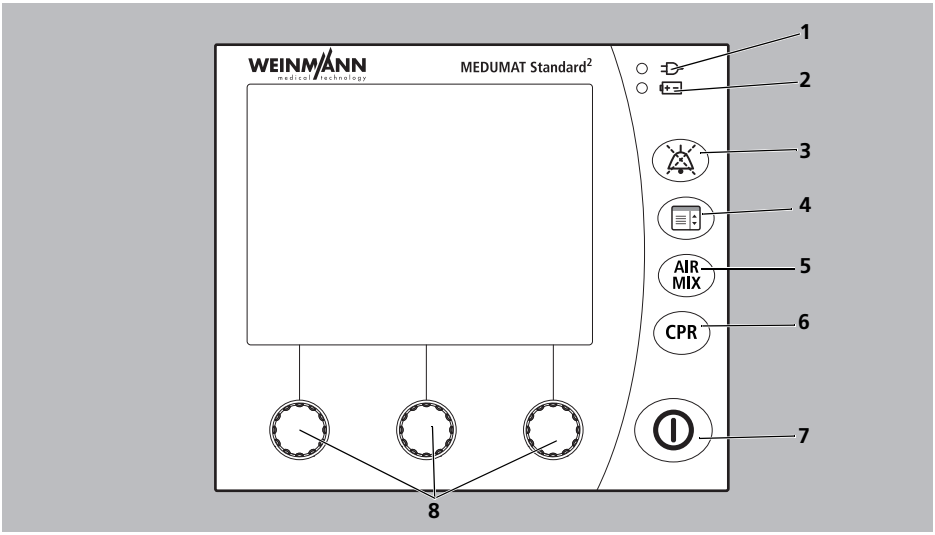
No.	Designation	Description
10	Loudspeaker	Emits audible alarms and metronome sounds.
11	Connection for measuring hose system	Connects the device to the measuring hose system of the patient hose system.
12	Connection for ventilation hose	Connects the device to the ventilation hose of the patient hose system.

3.2 Control panel



3-2 Controls

No.	Designation	Description
1	Line power indicator	Indicates that the device is connected to line power.
2	Battery status indicator	• Steady green light: The battery is full or is not being charged because it is full or outside the charging temperature range. • Flashing green light: The battery is being charged. • Steady red light: The battery is defective or not in the device. • No light: The device is operating on battery power and not on line power.

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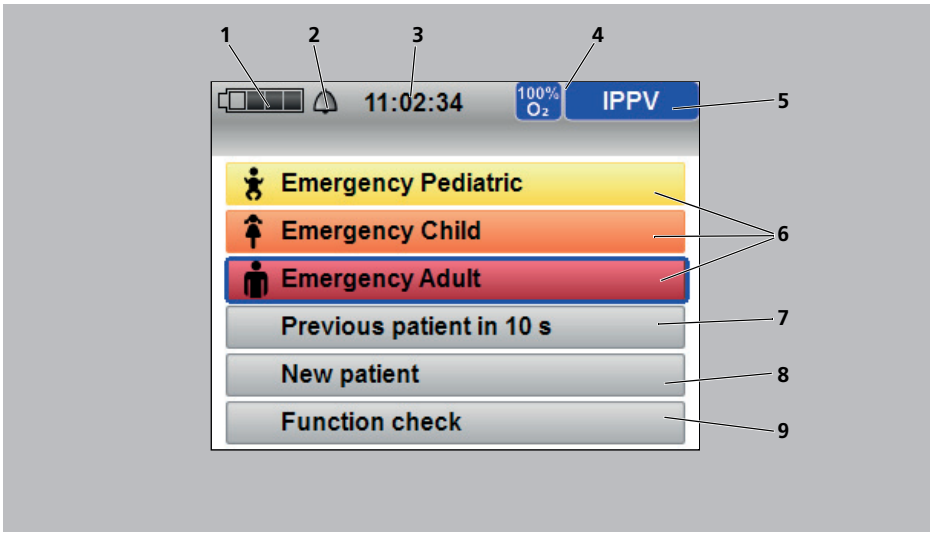
No.	Designation	Description
3	Alarm mute button	Mutes the alarm for 120 s.
4	Menu button	Provides access to the menu, ventilation modes and the operator menu.
5	Air Mix button	Switches between Air Mix mode and non-Air Mix mode.
6	CPR button	Activates or deactivates the CPR mode.
7	On/Off button	Switches the device on or off.
8	Navigation knobs	• Enable the selection of values for ventilation parameters. • Enables confirmation of values selected for ventilation parameters.

3.3 Display

3.3.1 Start menu



3-3 Start menu display

No.	Designation	Description
1	Battery status	Shows the battery status.

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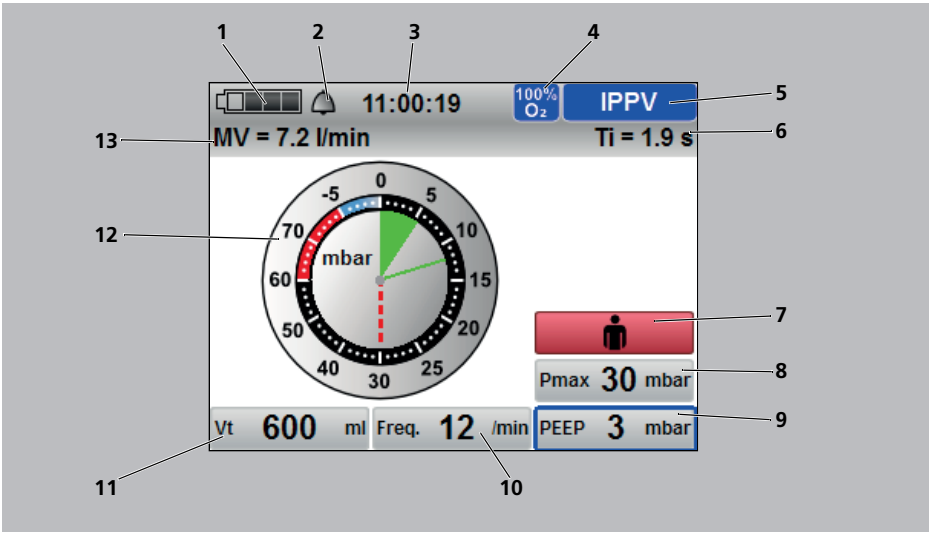
No.	Designation	Description
2	Alarm	Indicates whether the audio alarm output is active or has been muted.
3	Time	Displays the current time.
4	100% O_2 Air Mix	Indicates whether operation with 100% O_2 or Air Mix mode is activated.
5	Ventilation mode indicator	Indicates the currently selected ventilation mode.
6	Emergency modes	Provide access to the emergency modes.
7	Previous patient	Provides access to the emergency mode and the ventilation parameters set for the previous ventilated patient.
8	New patient	Provides access to the settings for a new patient.
9	Function check	Provides access to the function check.

3.3.2 Ventilation mode



3-4 Display in the ventilation mode IPPV

No.	Designation	Description
1	Battery status	Shows the battery status.
2	Alarm	Indicates whether the audio alarm output is active or has been muted.
3	Time	Displays the current time.

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No.	Designation	Description
4	100% O_2 Air Mix	Indicates whether operation with 100% O_2 or Air Mix mode is activated.
5	Ventilation mode indicator	Indicates the currently selected ventilation mode.
6	Inspiration time	Indicates the inspiration time. If an alarm is displayed, this information is omitted.
7	Emergency modes	Provides access to the emergency modes.
8	Pressure limitation (P_{max})	Indicates the maximum pressure limitation of the inspiratory pressure. Enables the maximum pressure limitation to be set.
9	Positive end-expiratory pressure (PEEP)	Indicates the positive end-expiratory pressure. Enables the positive end-expiratory pressure to be set.
10	Frequency	Indicates the ventilation rate. Enables the ventilation rate to be set.
11	Tidal volume (Vt)	Indicates the tidal volume. Enables the tidal volume to be set.
12	Gauge	Shows the ventilation progress. Shows P_{max} as a red line. Shows the currently attuning maximum airway pressure as a green line.
13	Minute volume	Indicates the precalculated minute volume. If an alarm is displayed, this information is omitted.

3.4 Symbols on the display

Symbol	Designation	Description
	Alarm symbol	Audio alarm output active
		Audio alarm output muted for 120 s (with the exception of an alarm at a supply pressure < 2.7 bar)

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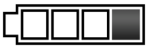
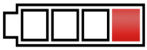
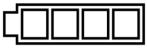
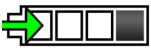
Symbol	Designation	Description
	Battery status symbol	Battery status > 90%
		Battery status approx. 60%-90%
		Battery status approx. 40%-60%
		Battery status approx. 10%-40%
		Battery status < 10%
		Battery empty **Battery empty** appears on the display and the device outputs the message: *Battery empty.* The device can still be used for exactly 15 minutes.
		• Battery is defective. **or** • No battery. **or** • Battery not at suitable temperature.
		Green arrow: Battery is charging
	Function check symbol	Device is ready for use
		Device is not ready for use
		Fault found during function check
		Consult instructions for use.
		Maintenance period exceeded.

Symbol	Designation	Description
	Ventilation mode symbols	Metronome sound in CPR mode is switched on.
		Metronome sound in CPR mode is switched off.
CPR		Period during which the device is in the CPR mode.
RSI		Period during which the device is in the RSI mode.
		Time since last mechanical breath
		Setting for intubated patients (continuous cardiac massage)
	Emergency mode symbols	Emergency mode Pediatric
		Emergency mode Child
		Emergency mode Adult

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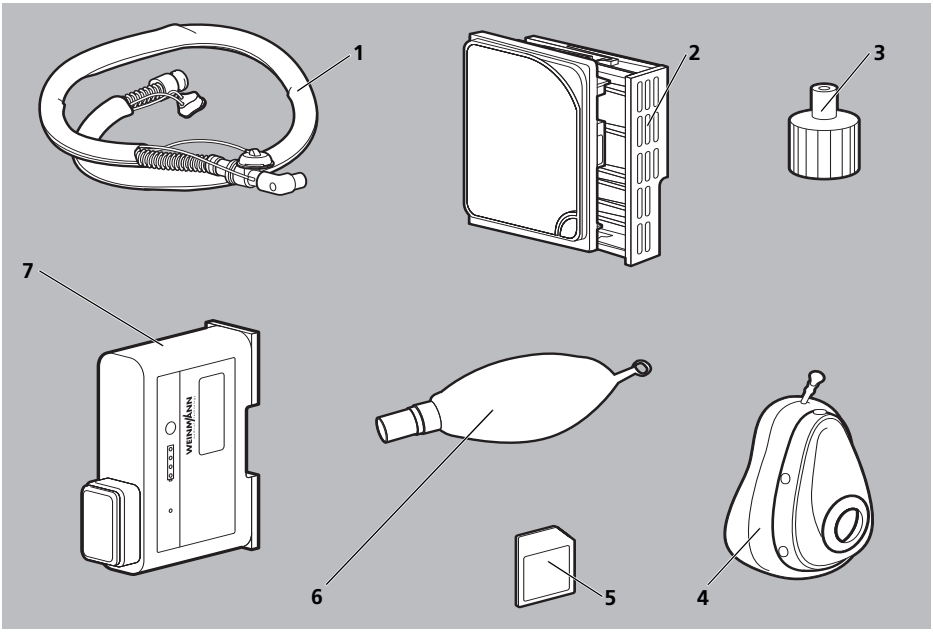
3.5 Components

3.5.1 Overview



3-5 Components

No.	Designation	Description
1	Patient hose system	Administers the gas for inspiration to the patient via a mask or tube (see "3.5.2 Patient hose system", page 24).
2	Device input filter	Filters the ambient air which has been sucked in.
3	Inhalation adapter	Facilitates inhalation.
4	Ventilation mask	Connects the patient hose system to the patient.
5	SD card	Used for reading session data and log files and updating the device software.
6	Testing bag	Simulates a ventilated patient during a function check.
7	Battery	Facilitates mobile power supply and can be replaced if necessary.

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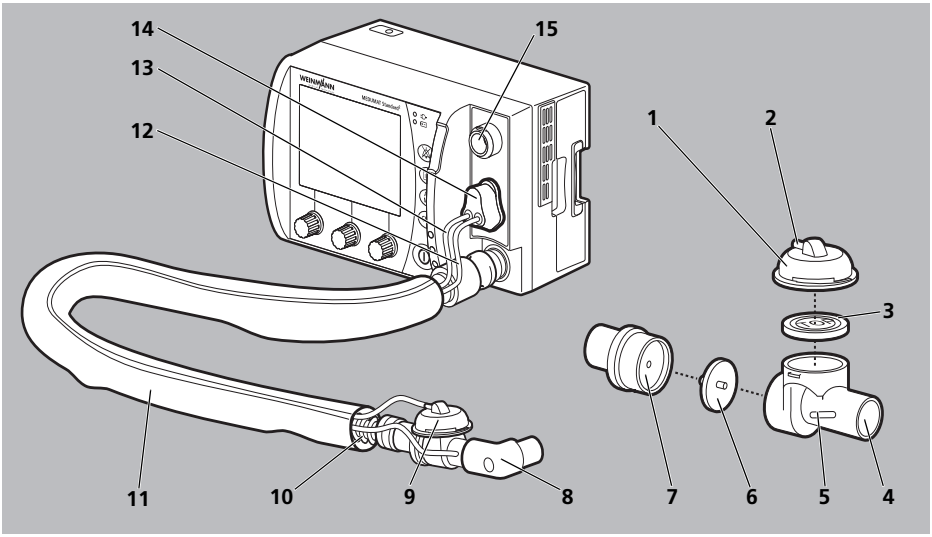
3.5.2 Patient hose system



3-6 Patient hose system and patient valve

No.	Designation	Description
Patient valve (reusable hose system)		
1	Control cover	Together with the PEEP control diaphragm, this creates a pressure chamber for PEEP control.
2	Connection for PEEP control hose	Connects the patient valve to the PEEP control hose.
3	PEEP control diaphragm	Together with the control cover, this creates a pressure chamber for PEEP control.
4	Main body	Provides a connection for a mask, tube or the elbow.
5	Connection for pressure-measurement hose	Connects the patient valve to the pressure-measurement hose.
6	Check valve diaphragm	Due to the check valve diaphragm, the respiratory gas only flows towards the patient. No rebreathing takes place.
7	Holder for check valve diaphragm	Connects the patient valve to the ventilation hose and contains the check valve diaphragm.

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No.	Designation	Description
Patient hose system (reusable hose system/disposable hose system)		
8	Elbow	Connects the patient valve to the mask/tube and can be removed.
9	Patient valve	Switches between inspiration and expiration.
10	Ventilation hose	The respiratory gas flows from the device to the patient valve through the ventilation hose.
11	Hose protection sleeve	Protects the ventilation hose against soiling and damage.
12	Pressure-measurement hose	Measures the ventilation pressure at the patient.
13	PEEP control hose	The device controls the patient valve and the PEEP via the PEEP control hose.
14	Measuring hose system connector	Connects the measuring hose system (PEEP control hose and pressure-measurement hose) to the connection for the measuring hose system on the device.
15	Connection for MEDUtrigger	Connects the MEDUtrigger to the device.

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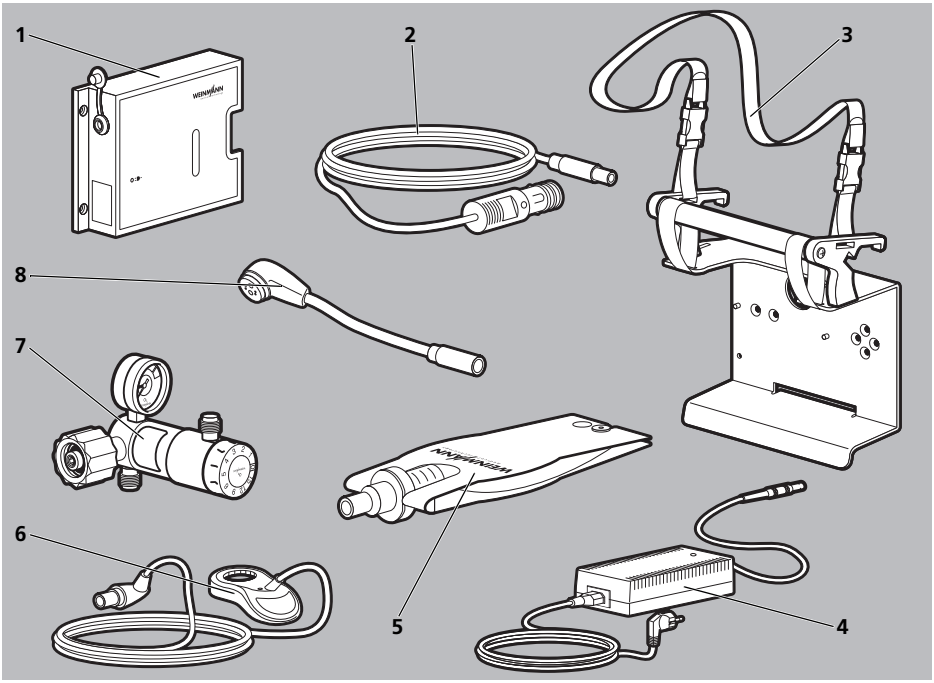
3.6 Accessories



3-7 Accessories

No.	Designation	Description
1	Charging station	Facilitates external battery charging.
2	12 V cable	Supplies power to the device from the vehicle's electrical system.
3	LIFE-BASE *light* XS	Portable system for mounting the device on frames and equipment rails.
4	Power supply	Supplies power to the device.
5	Test lung	Simulates a ventilated patient for presentation purposes and during a function check.
6	MEDUtrigger	Is used to manually trigger mechanical breaths.
7	Pressure reducer	Reduces the pressure of the oxygen from the oxygen cylinder to the operating pressure of the device.
8	Charging adapter	Connects the power supply or the 12 V cable to the device.

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3.7 Optional functions

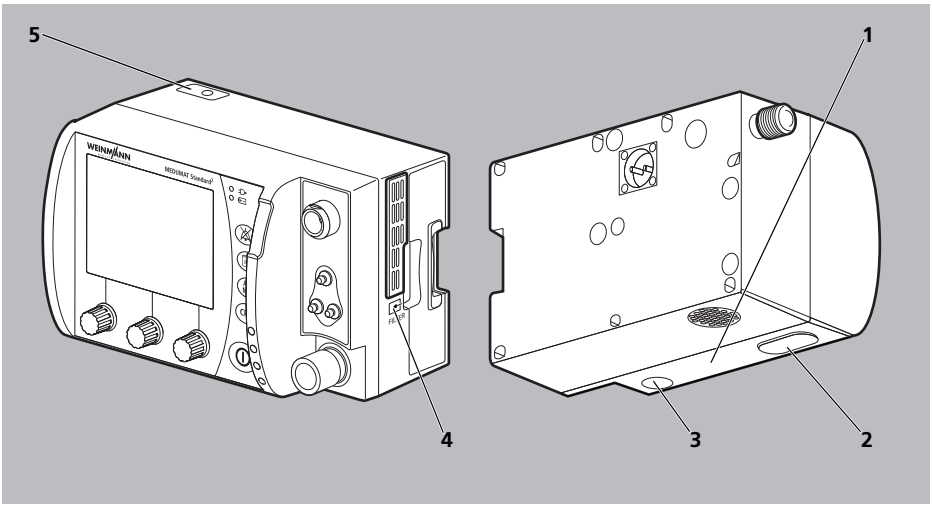
You can tailor the range of functions on the device to your needs with the optional functions. The optional functions are as follows:

Possible options	Description
Optional S-IPPV function	Enables the S-IPPV mode.
Optional SIMV function	Enables the SIMV mode.
Optional Inhalation function	Enables the Inhalation mode.

You must purchase an access code for each optional function not included when the device was purchased. The access code allows you to enable the optional function, then activate or deactivate it (see "5.3.8 Enabling optional functions", page 80).

3.8 Labels and symbols

3.8.1 Labels on the product



3-8 Labels on the product

No.	Symbol	Description
Device information label		
1	**SN**	Serial number
		Type BF applied part
		Input
		DC voltage
		Type of protection against electric shock: Protection class II device
		Do not dispose of device in household waste.
Device information label (continued)		
1		Manufacturer and date of manufacture
	IP54	Degree of protection against: • ingress of solid objects • ingress of dust • ingress of water with harmful effect
		Consult instructions for use.
	CE 0197	CE mark (confirms that the product complies with the applicable European directives)
Other labels and symbols		
2 / 5		Consult instructions for use.
3		Follow the instructions for use.
4		Input

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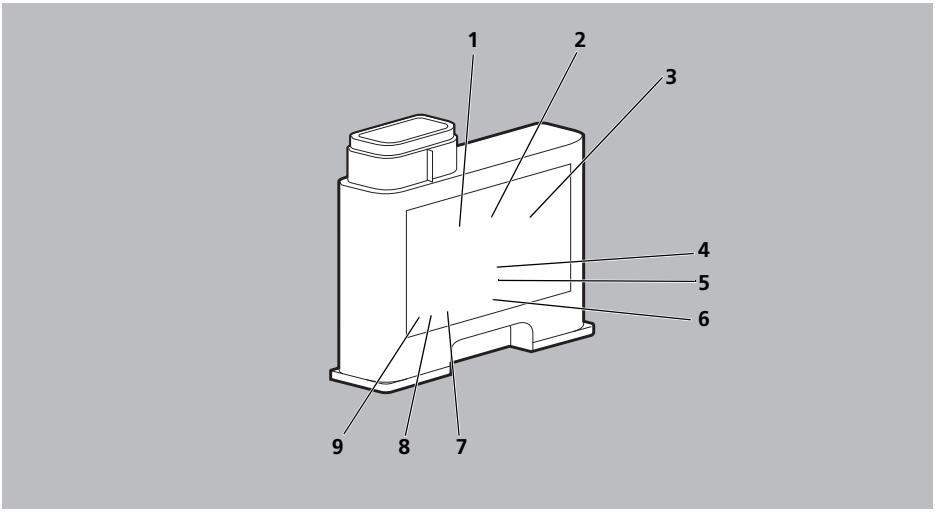
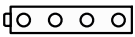
3.8.2 Symbols on the battery



3-9 Symbols on the battery

No.	Symbol	Description
1		Battery fault, if fault indicator light is red
2		Battery status
3 / 9		Consult instructions for use.
4		Date of manufacture
5	**SN**	Serial number
6		Manufacturer
7		Do not dispose of battery in household waste.
8		China RoHS label (confirms that the product does not emit toxic substances for the number of years indicated)

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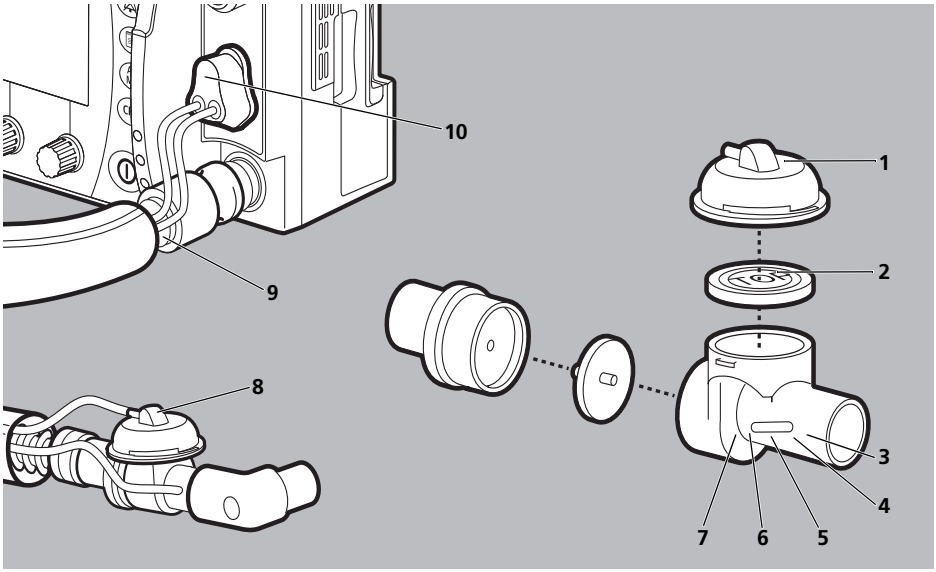
3.8.3 Symbols on the patient hose system



3-10 Symbols on the patient hose system

No.	Symbol	Description
Reusable hose system and disposable hose system		
1	INSP	Indicates the correct flow direction during inspiration.
2	TOP	Indicates the correct installation direction of the PEEP control diaphragm.
3	CE 0197	CE mark (confirms that the product complies with the applicable European directives)
4		Calendar clock for year and month
5		Consult instructions for use.
6	**>PC<**	Material designation: Polycarbonate
7	**134°C**	Steam sterilization at 134°C.

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No.	Symbol	Description
Additional symbols, for disposable hose system only		
8 / 10		Disposable items, do not reuse
9		Indicates the date when the next maintenance is due (Position: on the service label).

3.8.4 Symbols on the device information label of the MEDUtrigger

Symbol	Description
Device information label	
	Degree of protection against electric shock: Type BF device
	Do not dispose of device in household waste.
CE 0197	CE mark (confirms that the product complies with the applicable European directives)
IP54	Degree of protection against: • ingress of solid objects • ingress of dust • ingress of water with harmful effect
	Type of protection against electric shock: Protection class II device
	Manufacturer and date of manufacture

3.8.5 Labels on the packaging

Symbol	Description
Device	
	Protect the device against moisture.

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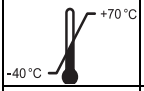
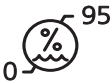
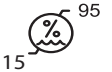
Symbol	Description
	Permissible storage temperature: -40°C to +70°C
	Permissible humidity for storage: max. 95% relative humidity
	Fragile
SN	Serial number
CE 0197	CE mark (confirms that the product complies with the applicable European directives)
Patient hose system (reusable hose system and disposable hose system)	
	Latex-free
	Permissible storage temperature: -30°C to +70°C
	Permissible humidity for storage: 15% to 95% relative humidity
CE 0197	CE mark (confirms that the product complies with the applicable European directives)
	Manufacturer and date of manufacture
Additional symbols, for disposable hose system only	
	Disposable items, do not reuse
	Expiration date

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4 Preparation and operation

4.1 Mounting the device

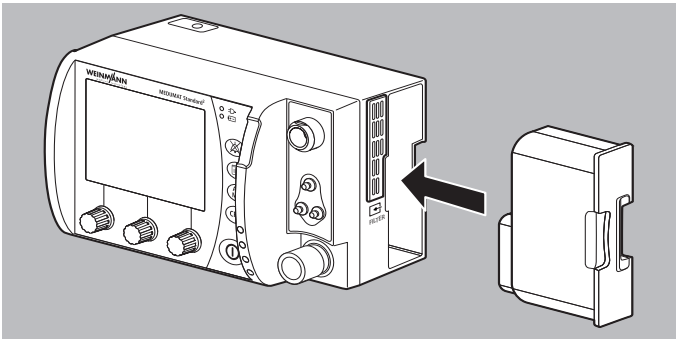
The device is mounted on a portable system as standard and is ready for use. Observe the instructions for use of the portable systems.

4.2 Connecting to a power supply

NOTICE

Loss of power due to combination of the device with an incorrect power supply!
If you use a portable system which combines the MEDUMAT Standard^2 and MEDUCORE Standard devices, a loss of power may occur in the devices in the event that these are used with a 70 W power supply.
⇒ Use only the more powerful 100 W power supply unit when combining the devices MEDUMAT Standard^2 and MEDUCORE Standard.

1. Check battery status (see "4.3 Using the rechargeable battery", page 34).
2. If necessary: Charge battery (see "4.3.2 Charging the battery in the device", page 34).



3. Slide full battery into the battery compartment until it clicks into place.

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4. If necessary:
   If operating on the portable system, mount the portable system on a wall mounting with charging interface.

   or

   Connect the device up to the line power with the charging adapter (WM 28979) and the 50 W or 100 W power supply.

   or

   Connect the device up to the vehicle's electrical system with the charging adapter (WM 28979) and 12 V cable.

Result The device is ready for use.

4.3 Using the rechargeable battery

4.3.1 General instructions

- Always operate the device with the rechargeable battery WM 45045.
- The expected life of the battery is 2 years. Recommendation: Replace the battery after 2 years. If battery life has substantially dropped before then, replace the battery earlier.

4.3.2 Charging the battery in the device

Requirement
- The portable system is mounted on a wall mounting with charging interface

  or

- The device is connected to the line power via the power supply.

1. Insert battery into the battery compartment.
   Charging starts automatically if the following conditions are met:
   - external supply of at least 10 V is connected
   - battery is not yet fully charged (< 95% charge level)
   - battery temperature between 0°C and 45°C

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2. If the device is switched on, the green arrow appears in the battery status symbol on the display (example:), and the battery status indicator on the device flashes green. If the device is switched off, only the battery status indicator flashes green.

3. When the battery status indicator flashes green and/or the symbol appears on the display:
   The device can be disconnected from the charging interface or from the power supply.

Result The battery is fully charged.

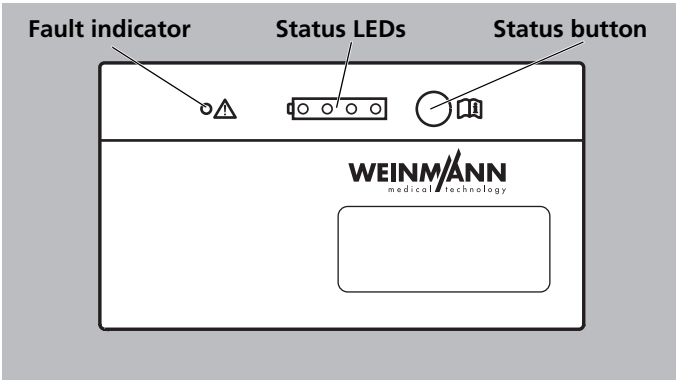
4.3.3 Charging the battery with the charging station

You can also charge the battery with the charging station WM 45190. Observe the instructions for use of the charging station.

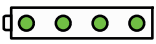
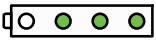
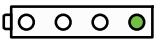
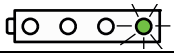
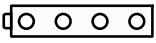
4.3.4 Battery status indicator

Battery

You can see the battery status on the battery itself.
The battery status is indicated by 4 green status LEDs. Simply press the status button on the battery.

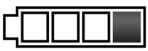
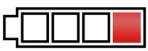


4-1 Status indicator on the battery

Status indicator	Explanation	Meaning
	4 LEDs are lit	Battery status > 90%
	3 LEDs are lit	Battery status approx. 60%-90%
	2 LEDs are lit	Battery status approx. 40%-60%
	1 LED is lit	Battery status approx. 10%-40%
	1 LED is flashing	Battery status < 10%
	No LEDs are lit	Battery is deeply discharged. Charge battery immediately. This will take longer than usual.
	Red fault indicator is lit	Battery defective. Replace battery.

Device

If the device is switched on, you can see the battery status on the display:

Status indicator	Meaning
	Battery status > 90%
	Battery status approx. 60%-90%
	Battery status approx. 40%-60%
	Battery status approx. 10%-40%
	Battery status < 10%

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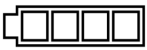
Status indicator	Meaning
	Battery empty **Battery empty** appears on the display and the device outputs the message: *Battery empty*. The device can still be used for exactly 15 minutes.
	• Battery is defective. **or** • No battery. **or** • Battery not at suitable temperature.

4.3.5 Changing the battery

Requirement The replacement battery is fully charged.

1. Switch off the device (see "4.6 Switching off the device", page 43) or connect it to the line power.
2. Take battery out of the battery compartment.
3. Slide the replacement battery into the battery compartment until it audibly clicks into place.
4. Switch on the device (see "4.5 Switching on the device", page 42).
   The symbol  appears on the display.

Result The device is operated with a fully charged battery.

4.4 Connecting components

4.4.1 Connecting the patient hose system

⚠ CAUTION

Risk of injury posed by ventilation with inhalation mask, tube or inhalation cannula!
Ventilation with an inhalation mask, tube or inhalation cannula connected may cause an injury to the patient.
⇒ Do not use an inhalation mask, tube or inhalation cannula for ventilation.

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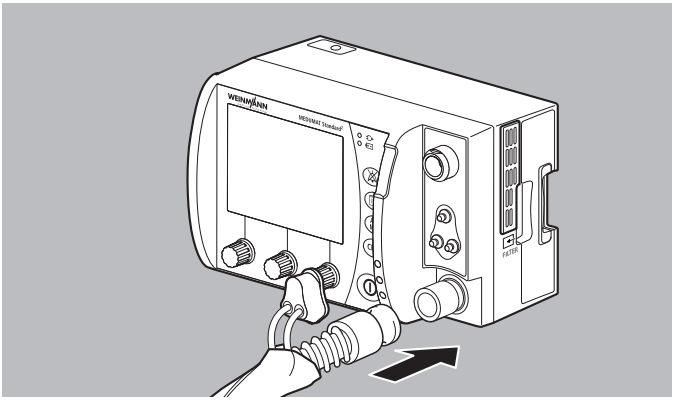
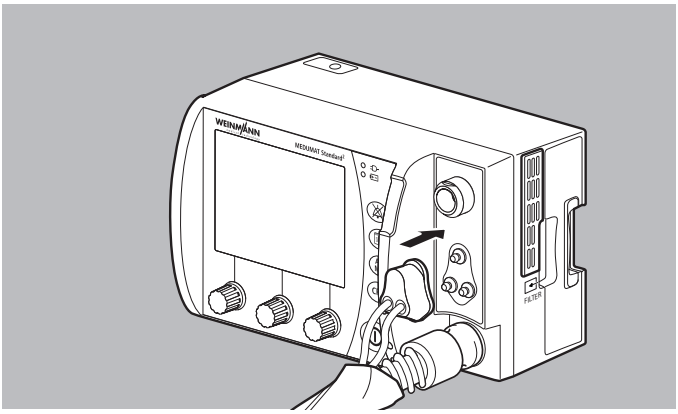


1. Connect the ventilation hose to the ventilation hose connection.



2. Connect the connection plug for the measuring hose system to the connection for the PEEP control hose and the connection for the pressure-measurement hose.

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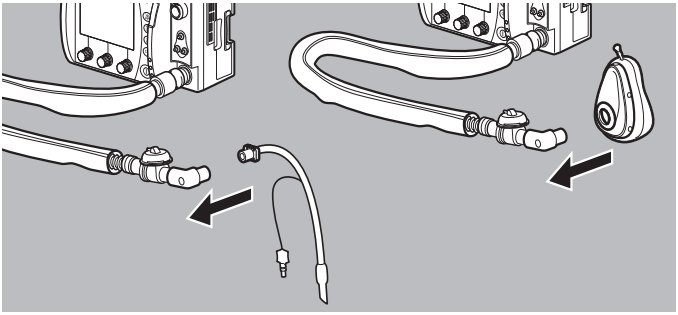

3. In the case of tube ventilation: Following intubation, attach the patient valve of the patient hose system to the tube, with or without an elbow.

   or

   In the case of mask ventilation: Attach the ventilation mask to the patient valve of the patient hose system, with or without an elbow.

4. In the event of a function check: Connect the testing bag up to the patient valve.

Result The patient hose system is connected to the device and is ready for use.

4.4.2 Inserting the device input filter

1. Check the device input filter for external damage.
   If necessary: Replace the device input filter.

NOTICE

Device may be damaged if a device input filter which has already been pushed together is inserted in the filter compartment!

On delivery, the filter cassette is inserted halfway into the device input filter and is fixed in its position by a transport safety device. If the filter cassette is pushed all the way into the device input filter before insertion into the filter compartment of the device, the function of the device input filter can no longer be guaranteed.

⇒ Do not alter the state of device input filters on delivery.

⇒ Do not insert the filter cassette in the device input filter single-handedly.

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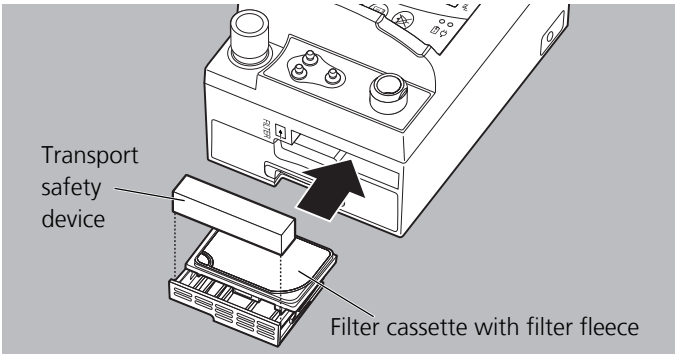

2. Remove the transport safety device from the device input filter.
3. Push the device input filter with the half-inserted filter cassette into the filter compartment of the device.
   In the process, the filter cassette is pushed all the way into the device input filter.
4. Press the device input filter into the filter compartment until the device input filter audibly clicks into place and sits flush with the device.
5. Perform a function check (see "8.3 Performing a function check", page 99).

Result The device input filter has been inserted.

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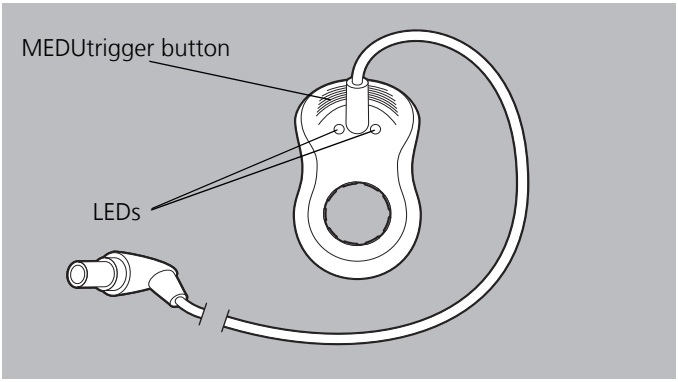
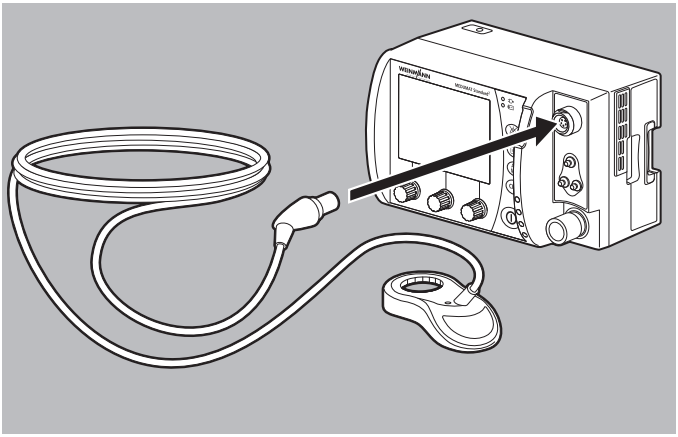
4.4.3 Connecting the MEDUtrigger

MEDUtrigger

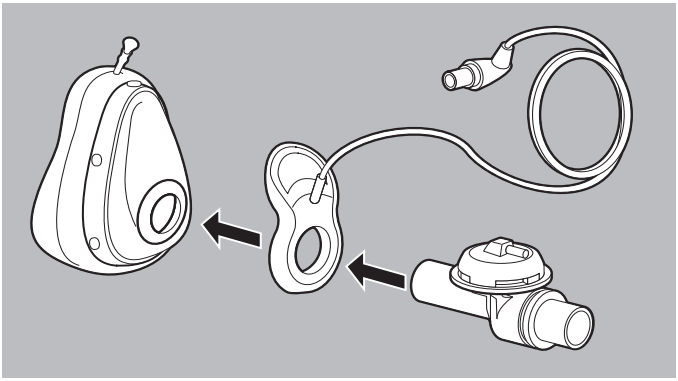
The operational readiness of the MEDUtrigger is indicated by 2 green LEDs on the MEDUtrigger. If the MEDUtrigger is connected to the device and the green LEDs on the MEDUtrigger are lit, you can trigger mechanical breaths manually by pressing the MEDUtrigger button.



4-2 MEDUtrigger



1. Plug the connector of the MEDUtrigger up to the connection for the MEDUtrigger on the device.



2. Attach the MEDUtrigger:
   - to the patient valve of the patient hose system

   or

   - to the elbow of the patient hose system

If you use a breathing system filter, always place the MEDUtrigger between the mask and the breathing system filter.

Result The MEDUtrigger is connected to the device and is ready for use.

4.5 Switching on the device

Requirement
- The device is disconnected from the patient.
- A fully charged battery is inserted in the device.
- The device is connected to the oxygen supply.

1. Briefly press the On/Off button (⏻).

   An automatic self-test starts, which runs through the following sequence:
   - The alarm light flashes twice and two short test tones are emitted
   - The start screen appears

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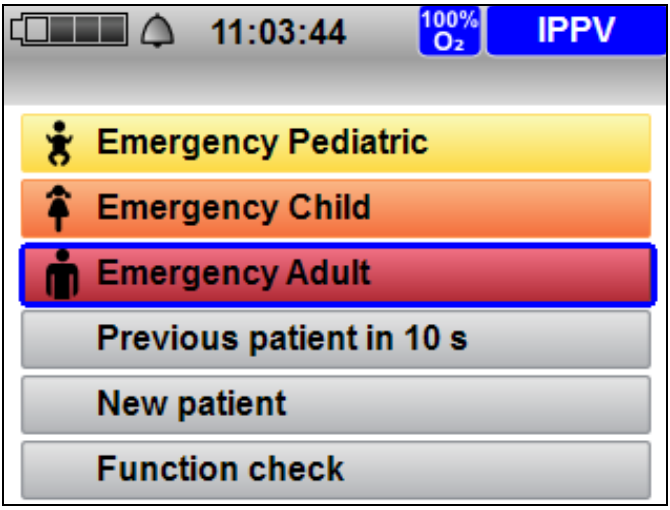
The self-test is successful when all of the steps have been completed.
After the self-test, the device displays the start menu:



2. If one or more steps were not completed: Do not operate the device.
3. Perform a function check (see "8.3 Performing a function check", page 99).

Result The device is ready for use.

4.6 Switching off the device

1. Press and hold the On/Off button ⏻ for at least 2 seconds.
2. Shut off the oxygen supply.

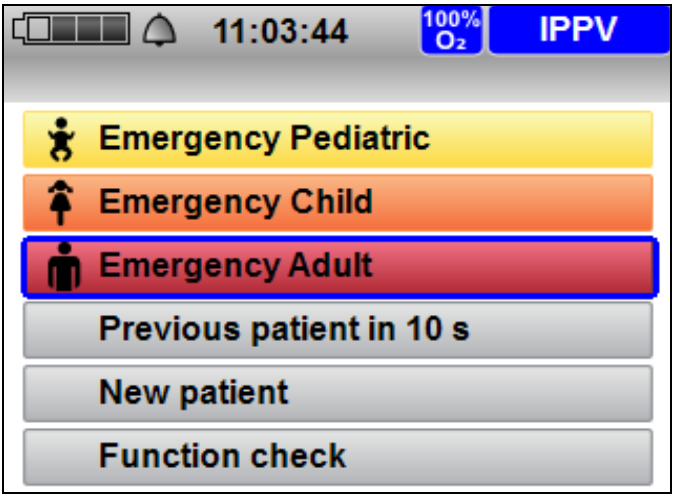
Result The device is completely switched off.

4.7 Ventilating the patient

4.7.1 Select the emergency mode from the start menu

Requirement The device is switched off.

1. Switch on the device.
   After the self-test, the device displays the start menu:



   A countdown in the field **Previous patient** counts down from 20 seconds.

If you do not select a menu within 20 seconds, the device automatically switches to the **Previous patient** menu and immediately begins ventilation of the patient, using the ventilation mode and parameters of the patient last ventilated.
To switch off the countdown, move one of the navigation knobs.

2. Select an emergency mode:
   - Emergency Pediatric
   - Emergency Child
   - Emergency Adult

   The device switches to **IPPV** mode with the ventilation parameters preset for the patient group (see "12.1.8 Factory settings for emergency modes", page 130).

Result An emergency mode for a particular patient group is activated.

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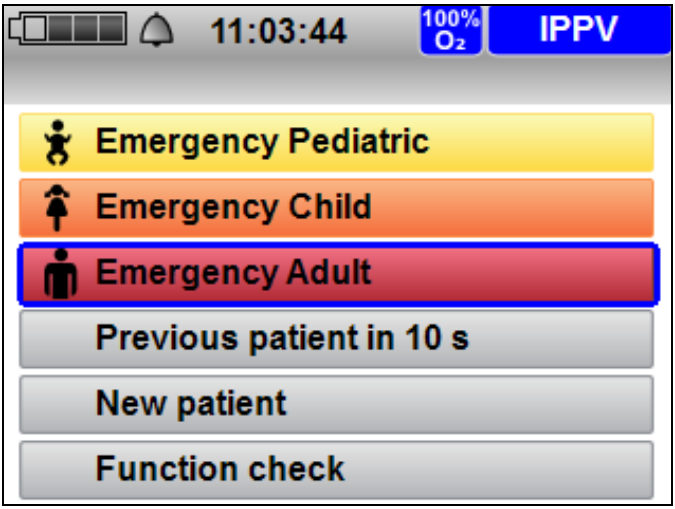
4.7.2 Calling up the parameters of the patient last ventilated

Requirement The device is switched off.

1. Switch on the device.
   After the self-test, the device displays the start menu:



   A countdown in the field **Previous patient** counts down from 20 seconds.

2. Select the field **Previous patient**.

   or

   Allow the countdown to run.

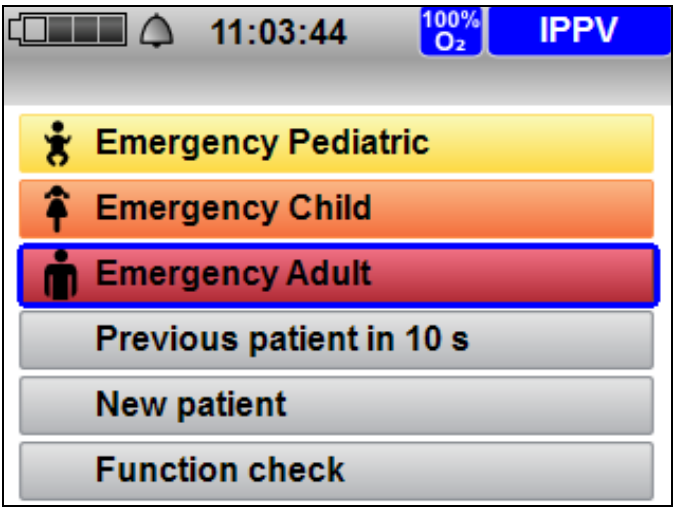
   The emergency mode and the set ventilation parameters of the patient last ventilated appear.

Result The emergency mode of the patient last ventilated is called up.

4.7.3 Selecting a ventilation mode for a new patient

Requirement The device is switched off.

1. Switch on the device.
   After the self-test, the device displays the start menu:



   A countdown in the field **Previous patient** counts down from 20 seconds.

If you do not select a menu within 20 seconds, the device automatically switches to the **Previous patient** menu and immediately begins ventilation of the patient, using the ventilation mode and parameters of the patient last ventilated.
To switch off the countdown before 20 seconds have elapsed, move one of the navigation knobs.

2. Select the field **New patient**.

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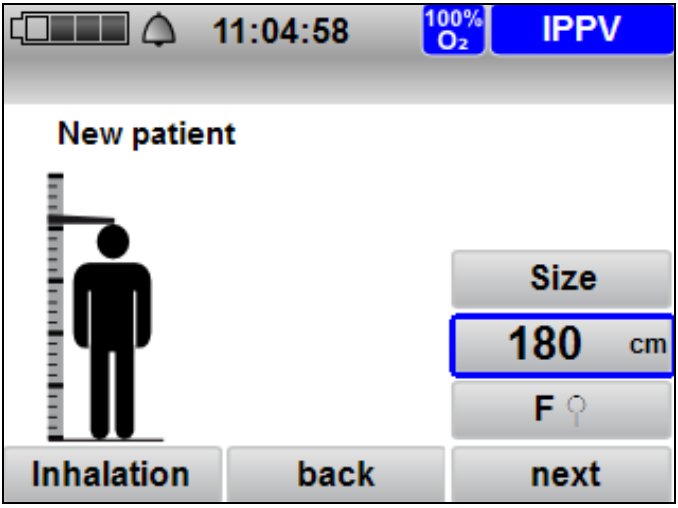
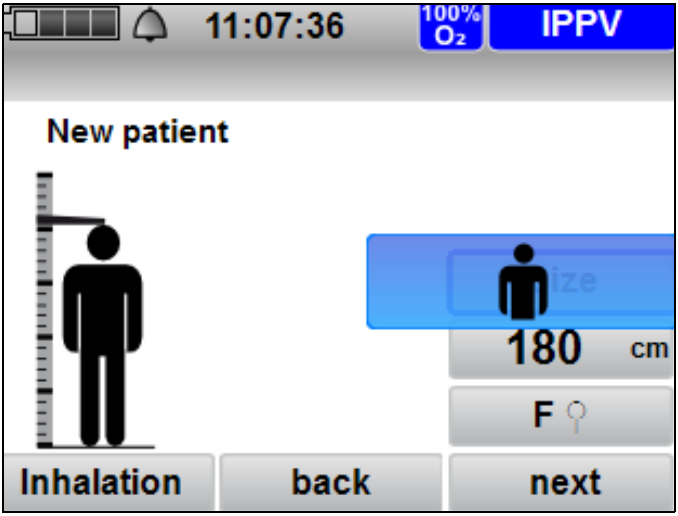


3. Select the height and gender: The height is given in 5 cm increments between 50 cm and 250 cm (see "12.2 Calculation of body weight by way of height", page 131)

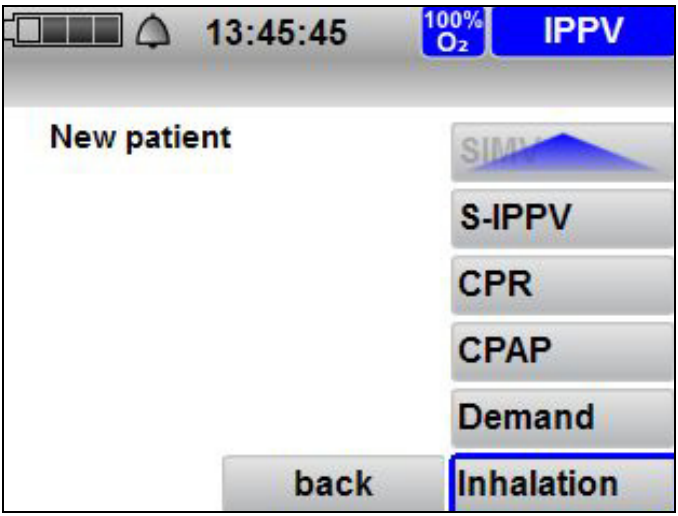
or



Navigate to the field **Size** and turn the navigation knob further to select the desired patient group:

- Adult
- Child
- Pediatric

4. Press the navigation knob **next**.



5. Select a ventilation mode.

   The device switches to the desired mode.

Result A ventilation mode for a new patient has been set.

4.7.4 Selecting an emergency mode from a ventilation mode

Requirement

- The device is switched on.
- One of the ventilation modes RSI, IPPV, SIMV or S-IPPV is set.

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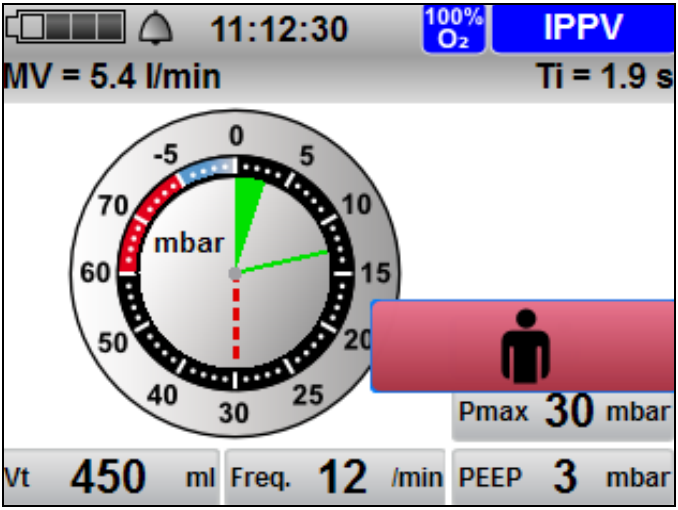

1. Select the field for the emergency mode using the right-hand navigation knob.
2. Select an emergency mode:
   - Emergency Pediatric
   - Emergency Child
   - Emergency Adult

   The device switches to **IPPV** mode with the ventilation parameters preset for the patient group (see "12.1.8 Factory settings for emergency modes", page 130).

You can adjust the preset ventilation parameters for the emergency modes in the operator menu: Operator menu | Presets patient.

Result An emergency mode for a particular patient group is activated.

4.7.5 Selecting a ventilation mode

Requirement
- The device is switched on.
- A ventilation mode is set.

1. Briefly press the menu button.

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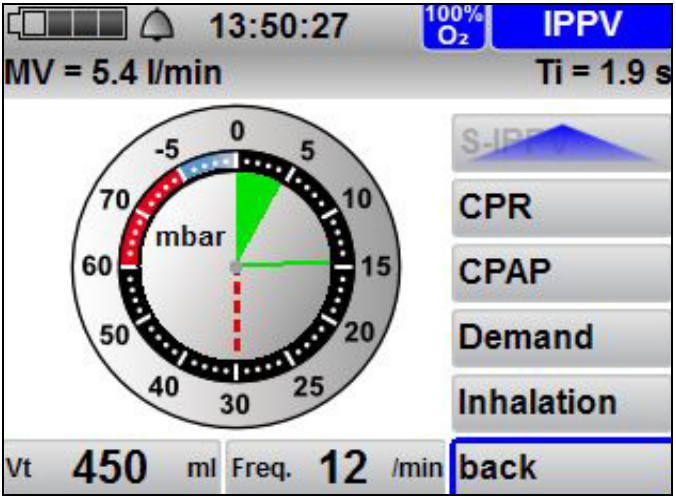

2. Select a ventilation mode.
   The device switches to the desired mode.

Result A ventilation mode is set.

4.7.6 Operating the device in 100% oxygen or Air Mix mode

Requirement

- The device is switched on.
- A ventilation mode is set.

1. Briefly press the Air Mix button (AIR MIX).
   Air Mix Air Mix appears in the status line and the device is operated in Air Mix mode.
2. Briefly press the 100% O_2 button (AIR MIX).
   100% O_2 100% O_2 appears in the status line and the device is operated in 100% oxygen mode.

100% O_2 mode is activated as standard for all emergency modes.

Result The device is operated in Air Mix mode or 100% O_2 mode.

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4.7.7 Performing inhalation

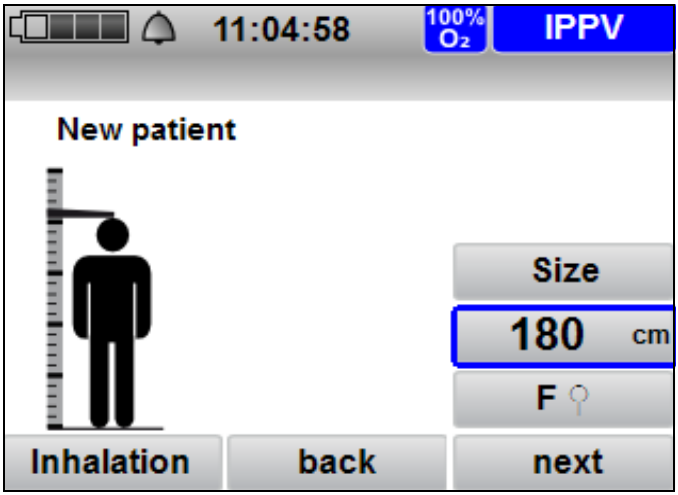
NOTICE

Using a nebulizer prevents treatment in Inhalation mode!
The device is not suitable for nebulizers. The device does not create sufficient pressure for this function.
⇒ Do not use nebulizers with this device.

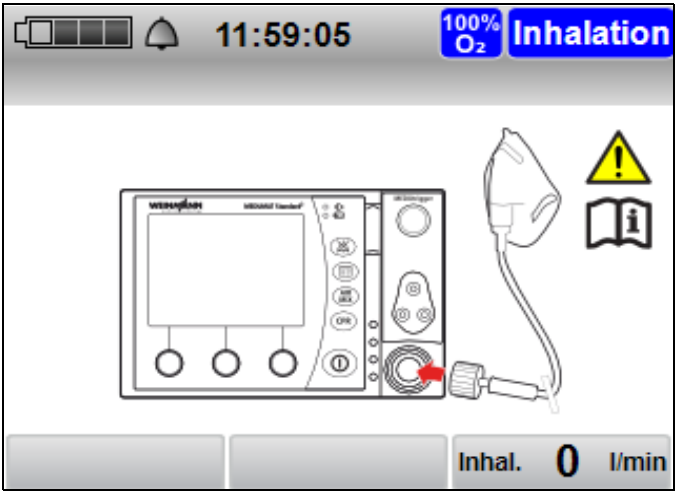
Requirement

- The patient is not connected via a tube.
- The device is switched on.
- The start menu is on the display.

1. Select the field **New patient**.
2. Select the height and gender (see "12.2 Calculation of body weight by way of height", page 131).



3. Select the field **Inhalation** using the left-hand navigation knob.
   The device switches to Inhalation mode.



4. Attach the inhalation adapter to the connection for the ventilation hose.
5. Connect an inhalation mask, tube or inhalation cannula.
6. Select flow for inhalation using the right-hand navigation knob.

Result The inhalation is performed.

4.7.8 Performing ventilation in CPR mode

In CPR mode, you determine the respiratory rate administered yourself. Using the MEDUtrigger, you manually trigger individual mechanical breaths with the set tidal volume.

⚠ CAUTION

Delay in treatment due to simultaneous metronome outputs from the ventilator and the defibrillator!
If the ventilator is used together with a defibrillator which can also emit a metronome sound (MEDUCORE Standard), the simultaneous metronome outputs from the defibrillator and the ventilator may confuse the user and cause delays in treatment.
⇒ Where the ventilator and defibrillator are used at the same time, switch off the metronome sound of the MEDUMAT Standard[2].

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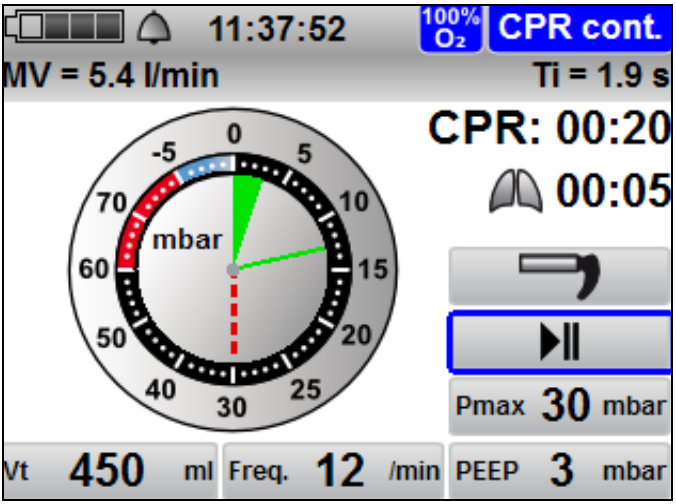
Requirement

- The device is switched on.
- A ventilation mode is set.
- The MEDUtrigger is connected to the device.

1. Briefly press the CPR button (CPR).
   The device switches to the mode **CPR 30:2/CPR 15:2/ CPR cont.** (depending on the preset). The green LEDs on the MEDUtrigger light up.



2. If necessary: Change the rhythm:
   - 30:2
   - 15:2
   - Continuous
3. Press and hold the MEDUtrigger button during the ventilation phase until two mechanical breaths are performed

   or

   If the green LEDs on the MEDUtrigger are lit, briefly press the MEDUtrigger button and trigger each of the mechanical breaths manually.
4. To leave the CPR mode following the completion of cardiopulmonary resuscitation, press the CPR button (CPR).

You can adjust the startup behavior of the CPR mode in the operator menu: Operator menu | Presets patient | CPR mode.

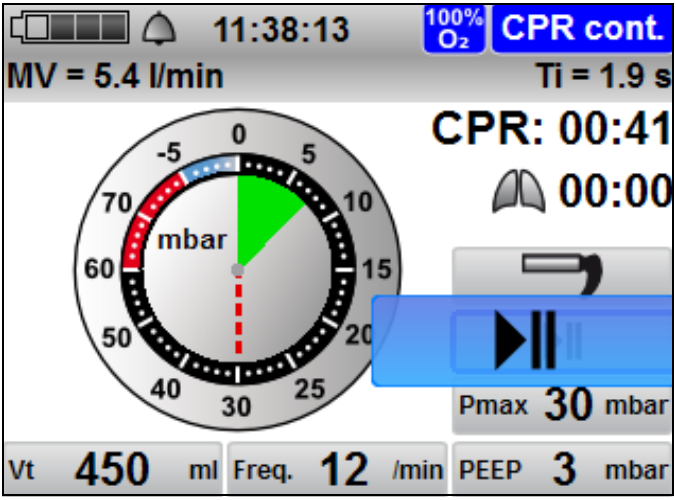
Result Ventilation is performed in CPR mode.

Pausing ventilation in CPR mode

During the analysis of the defibrillator, you can pause ventilation in order to avoid artifacts in the analysis.

Requirement

- The device is switched on.
- The CPR mode is set.
- Continuous ventilation is activated.



1. Select the **Pause** field.
   Ventilation pauses for 50 seconds. A countdown indicates the remaining time.

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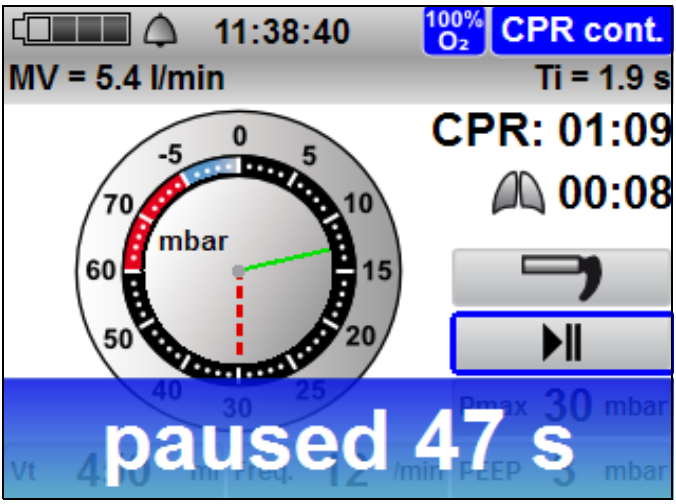


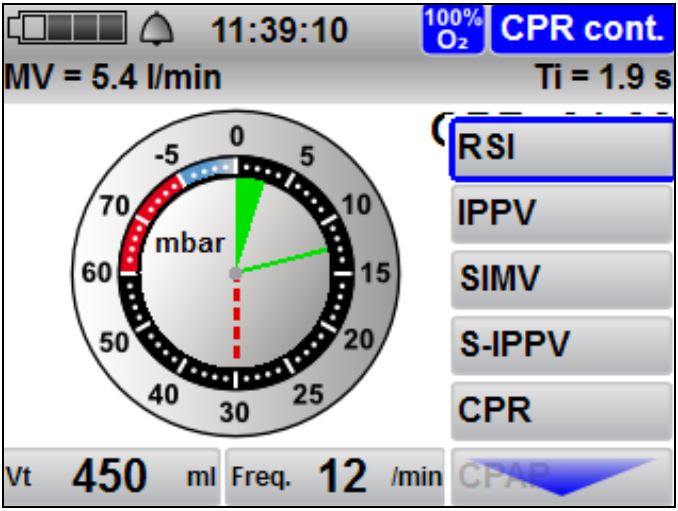
Result Ventilation pauses.
When the countdown reaches zero, ventilation automatically restarts.

4.7.9 Performing ventilation in RSI mode

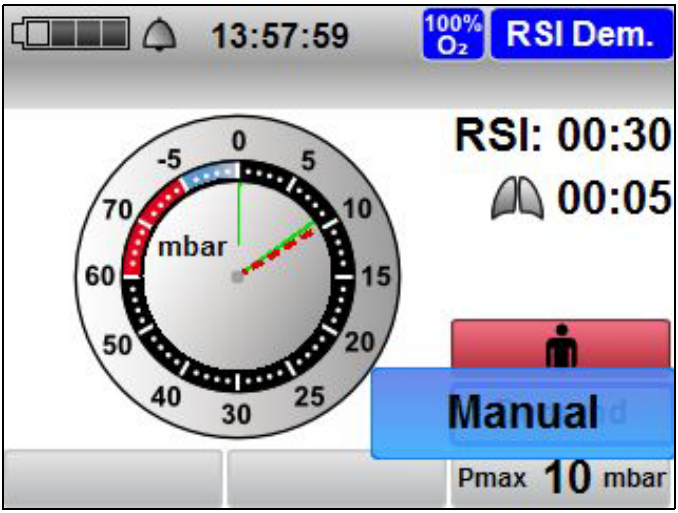
Requirement

- The device is switched on.
- The MEDUtrigger is connected to the device.
- A ventilation mode is set.

1. Briefly press the menu button .



2. Select **RSI** mode.
   The device switches to RSI mode.
   The Demand function starts automatically.



3. For the function **Manual**, navigate to the field **Demand** and select the field **Manual**.

To enable the selection of the function **Manual**, a MEDUtrigger must be connected. Otherwise, this function will not be displayed.

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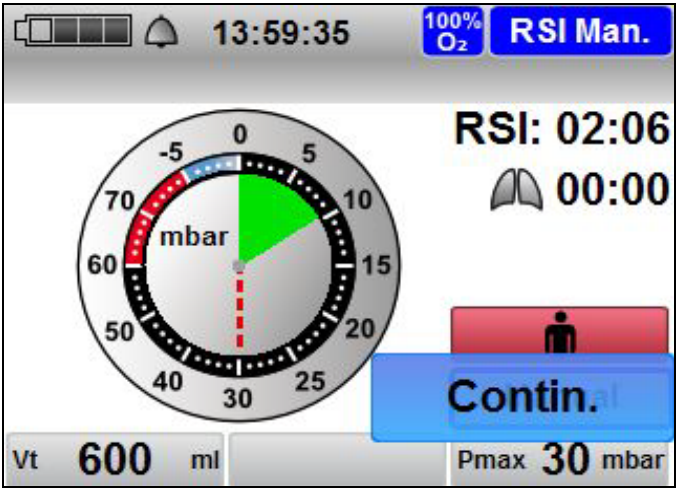

4. To perform continuous ventilation following successful airway management, select the **Contin.** field.
   The device switches to **RSI IPPV** mode.

Result Ventilation is performed in RSI mode.

4.8 Monitoring the patient

During ventilation, you must monitor the patient continuously. You can see the ventilation progress on the gauge and in the measurements shown on the display of the device (see "3.3.2 Ventilation mode", page 19).

All of the displayed measurements for flow, tidal volume, or minute volume relate to ambient temperature and ambient air pressure.

High airway resistances, e.g., due to obstructions of the airways or during external cardiac massage, may change the respiratory minute volume, depending on the ventilation mode.

In the event that the compliance of the lungs is reduced, the device reacts by increasing the ventilation pressure to the set pressure limit whilst the ventilation volume remains constant. Then the applied volume drops.

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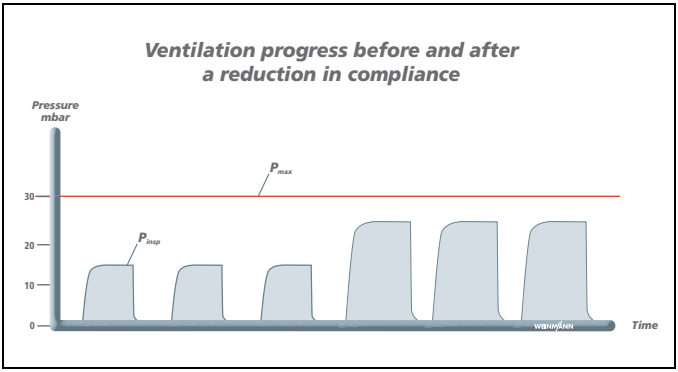

4-3 Ventilation progress before and after a reduction in compliance

4.9 Audio alarm output

4.9.1 Muting the audio alarm output

Requirement An alarm is active and is audible.

1. Briefly (< 2 s) press the alarm mute button .

Result The audio alarm output is muted for 120 s.
The symbol appears on the display.

4.9.2 Canceling the muting of the audio alarm output

Requirement An alarm is active and is muted.

1. Briefly (< 2 s) press the alarm mute button .

Result The muting of the audio alarm output is canceled.
The symbol appears on the display.

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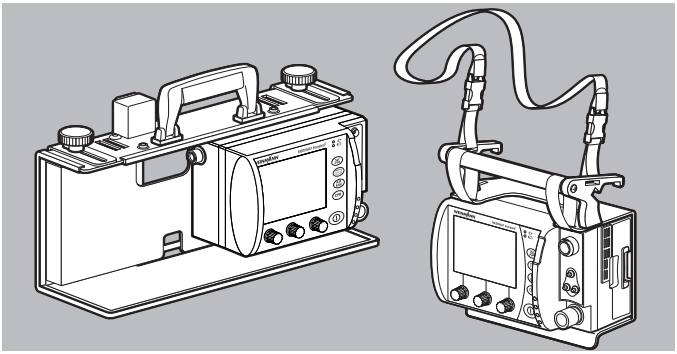
4.10 Transporting the device



4-4 Transport on a portable system

You can transport the device in any of the following three ways:

- On the portable system LIFE-BASE 3 NG
- On the portable system LIFE-BASE 1 NG XL
- Using the portable system LIFE-BASE *light* XS

4.11 Feeding in oxygen

4.11.1 Connecting an oxygen supply

⚠ WARNING

Risk of injury posed by the combination of highly compressed oxygen and hydrocarbon compounds!
When combined with highly compressed oxygen, hydrocarbon compounds (e.g., oil, grease, cleaning alcohols, hand cream or adhesive plasters) can cause explosions and injuries to the patient, user and bystanders.
⇒ Wash hands thoroughly and remove adhesive plasters before using highly compressed oxygen.

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⚠ WARNING

Risk of injury if oxygen escapes from damaged oxygen cylinders or pressure reducers!

Oxygen can escape unchecked from damaged oxygen cylinders or pressure reducers. This may lead to explosions and cause injury to the patient, user and bystanders.

⇒ Tighten all screwed unions on the oxygen cylinder and on the pressure reducer by hand only.

⇒ Secure the oxygen cylinder so that it cannot fall over.

⚠ CAUTION

Risk of injury due to particles of dust which have been blown away!

When you open the oxygen cylinder, particles of dust which are blown away by the high pressure may injure the user or bystanders.

⇒ Hold the valve opening so that it points away from the body.

⇒ Hold the valve opening so that no bystanders can be affected.

NOTICE

Connecting several devices to the same oxygen supply may result in loss of performance!

If you connect several devices to the same oxygen supply, the performance of the device and of the individual components may be reduced.

⇒ Do not operate the device simultaneously with other components sharing the same oxygen supply.

Requirement

- The patient is not connected to the device.
- The oxygen cylinder is full.

1. Briefly open and then close the valve of the oxygen cylinder in order to blow away any particles of dust.

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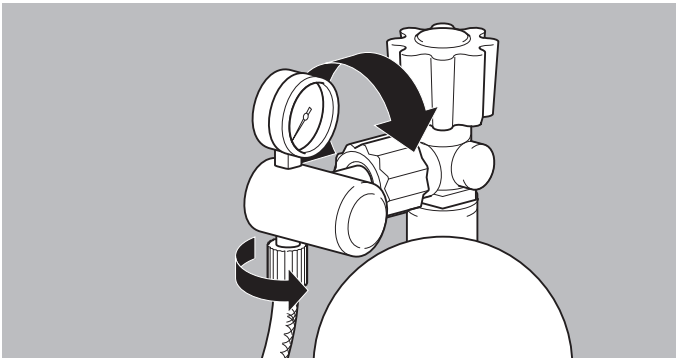
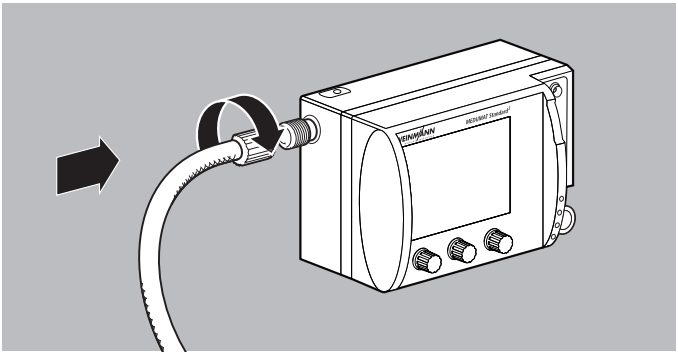


2. Connect a pressure reducer to the valve of the oxygen cylinder with a knurled union nut and tighten it by hand.
3. If necessary: Connect a pressure hose to the outlet of the pressure reducer using the union nut.



4. If necessary: Connect a pressure hose to the compressed gas connection of the device.

Result The device is connected to the oxygen supply.

4.11.2 Removing the oxygen supply

1. Close the valve on the oxygen cylinder.
2. Briefly press the On/Off button ⏻ and operate the device without an oxygen supply.
   The remaining oxygen is flushed out of the device.
3. Press and hold the On/Off button ⏻ for at least 2 seconds to switch off the device.

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4. Disconnect the pressure hose from the compressed gas connection of the device.
5. If necessary: Replace the empty oxygen cylinder.

Result The device is disconnected from the oxygen supply.

4.11.3 Calculating the operating time

1. Calculating the oxygen level in the cylinder (oxygen supply):

Oxygen supply = Volume of the oxygen cylinder x Pressure in the oxygen cylinder		
Example		
Volume of the oxygen cylinder	10 l	2 l
Pressure in the oxygen cylinder	200 bar	200 bar
Oxygen level in the cylinder (oxygen supply)	**2000 l**	**400 l**

2. Calculating the operating time:

100% oxygen mode:

$$\text{Time(min)} = \frac{\text{Oxygen supply(l)}}{\text{Vt(l)} * \text{f(min}^{-1}\text{)} + 0.3\text{l}}$$

Example	
Oxygen supply	2000 l
Vt	500 ml
f	12 min^{-1}
Time	**317 min = 5 h 17 min**

Air Mix mode:

$$\text{Time(min)} = \frac{\text{Oxygen supply(l)}}{(\text{Vt(l)} * \text{f(min}^{-1}\text{)} + 0.3\text{l}) * 2}$$

Example	
Oxygen supply	2000 l
Vt	500 ml
f	12 min^{-1}
Time	**634 min = 10 h 34 min**

Result The operating time has been calculated.

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4.12 After use

1. Detach the patient hose system from the ventilation mask or tube.
2. If necessary: Dispose of the ventilation mask or tube.
3. If necessary: Disconnect the patient hose system from the device.
4. If necessary: Dispose of the disposable hose system.
5. If necessary: Take a new disposable hose system.
6. Hygienically prepare the device, components and accessories (see "7 Hygienic preparation", page 92).
7. If necessary: Take a new ventilation mask or new tube.
8. If necessary: Stow the components and accessories away on the portable system.
9. If necessary: Store the device, components and accessories (see "11 Storage and disposal", page 119).

4.13 Disassembly/assembly of the reusable hose system

4.13.1 Disassembly of the reusable hose system

Requirement

- The device is disconnected from the patient hose system.
- The patient is disconnected from the patient hose system.

1. Remove the hose protection sleeve from around the patient hose system.
2. Detach the measuring hose system (PEEP control hose and pressure-measurement hose) from the ventilation hose at the velcro fasteners.
3. Disconnect the PEEP control hose and the pressure-measurement hose from the patient valve.
4. Disconnect the elbow from the patient valve.

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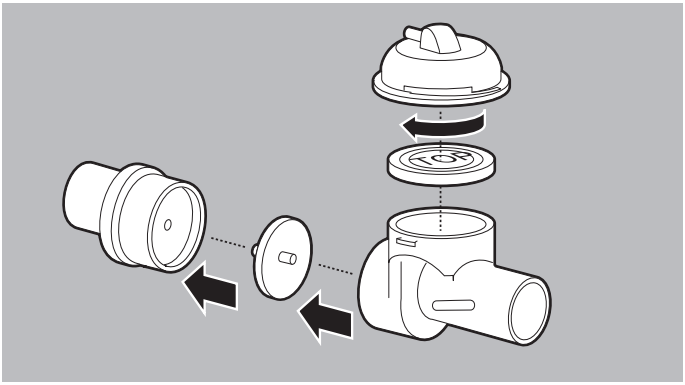
5. Disconnect the patient valve from the ventilation hose.

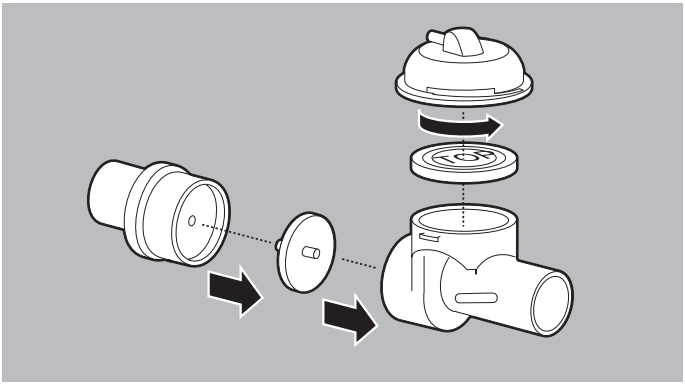


6. Dismount the patient valve.

Result The reusable hose system is disassembled.

4.13.2 Assembly of the reusable hose system

Requirement The reusable hose system is disassembled.



1. Mount the patient valve.
   In doing so, note:
   - the side of the PEEP control diaphragm labeled "TOP" must face upward toward the control cover.
   - the arrow on the control cover must point toward the patient.
2. Connect the patient valve to the ventilation hose.

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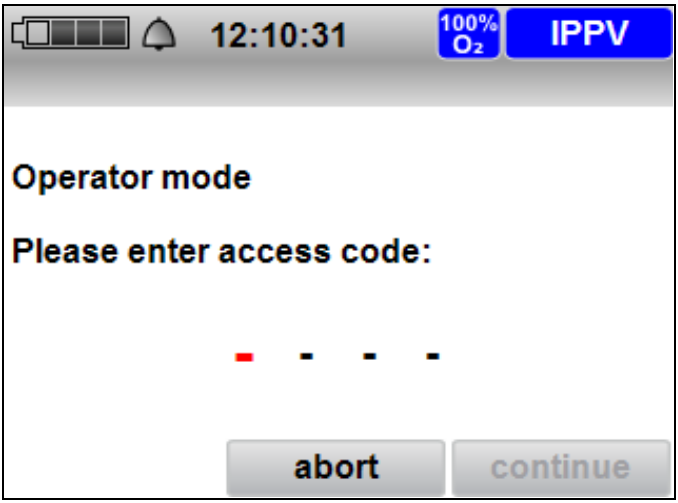
3. Connect the measuring hose system (PEEP control hose and pressure-measurement hose) to the patient valve.
   In doing so, note: Both hoses must be firmly attached to the patient valve.
4. If necessary: Connect the elbow to the patient valve.
5. Attach the measuring hose system (PEEP control hose and pressure-measurement hose) to the ventilation hose using the velcro fasteners.
6. Place the patient hose system in the hose protection sleeve and close it.
7. Perform a function check (see "8.3 Performing a function check", page 99).

Result The reusable hose system is assembled.

5 Menu settings

5.1 Navigating the operator menu

1. Switch on the device.
   The start menu appears.
2. Briefly press the menu button .



3. Turn the right-hand navigation knob to enter the first digit of the access code.
4. Press the navigation knob **next** to confirm the first digit of the access code.
5. Enter the other digits of the access code in the same way.

On delivery, the access code for the operator menu is 0000. You can change the access code: Operator menu | Change access code.

6. Press the navigation knob **ok** to confirm the access code.
   The operator menu appears on the display.

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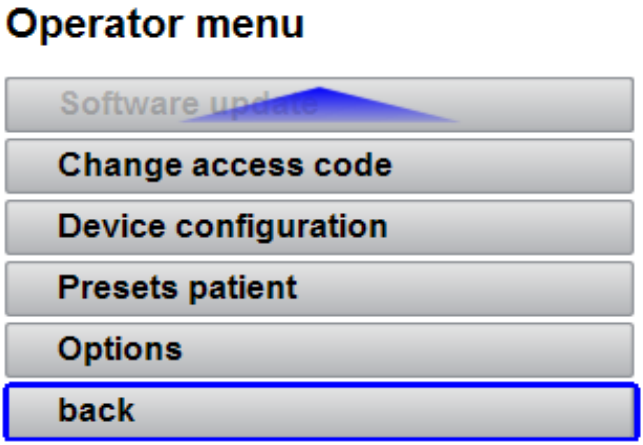
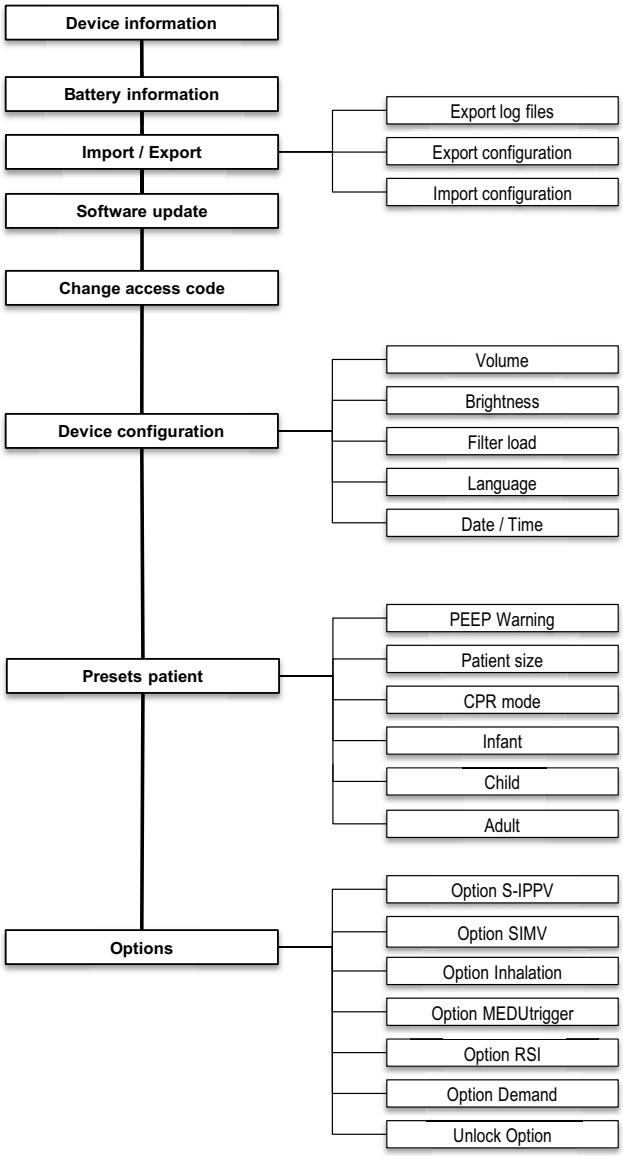


7. To select a submenu, turn one of the three navigation knobs.
8. To call up a submenu, press one of the three navigation knobs.
9. To select a desired value, turn one of the three navigation knobs.
10. To confirm a value, press one of the three navigation knobs.
11. To reset values to their original state, press the menu item **Reset**.
12. To leave the menu, press the menu item **back** until the menu closes.

Result You know how to navigate the menu.

5.2 Structure of the operator menu



5-1 Structure of the operator menu

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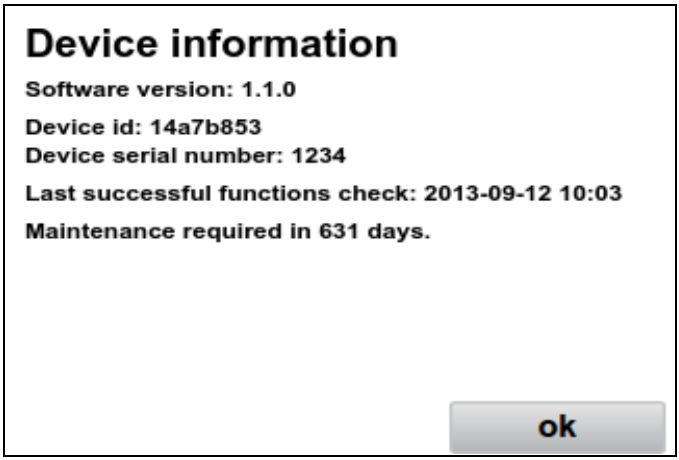
5.3 Settings in the operator menu

5.3.1 Device information



5-2 Device information submenu

Here you can see the following information about the device:

- Installed software version
- Device ID
- Device serial number
- Date of last successful function check
- Date of next scheduled maintenance

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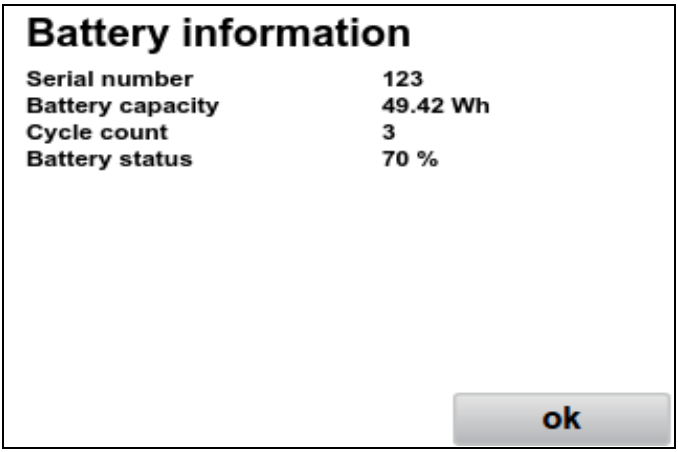
5.3.2 Battery information



5-3 Battery information submenu

Here you can see the following information about the battery:

- Serial number
- Battery capacity
- Cycle count
- Battery status

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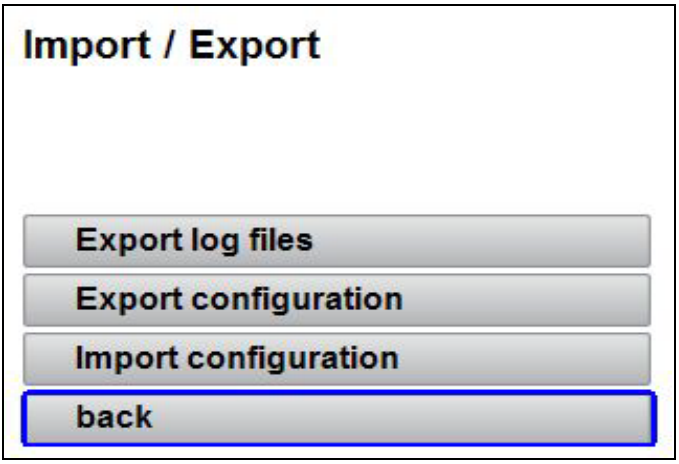
5.3.3 Import/export



5-4 Import / export submenu

Exporting log files

The device always saves the session data to its internal memory. You can export data to an SD card in order to analyze it.

Detailed information on exported log files can be found in the appendix (see "12.3 Exported log files", page 132).

Exporting a configuration

This function allows you to export all the configuration settings performed on the device to an SD card.

As a general rule, all the configuration settings are exported, with the exception of the following values:

- Date and time
- Serial number
- Device runtime
- Filter runtime
- Date of last function check
- Date of last maintenance
- Number of start-ups

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Importing a configuration

This function allows you to import the configuration settings exported to an SD card from a device onto a second device. Following the import, the second device is configured in exactly the same way as the original device.

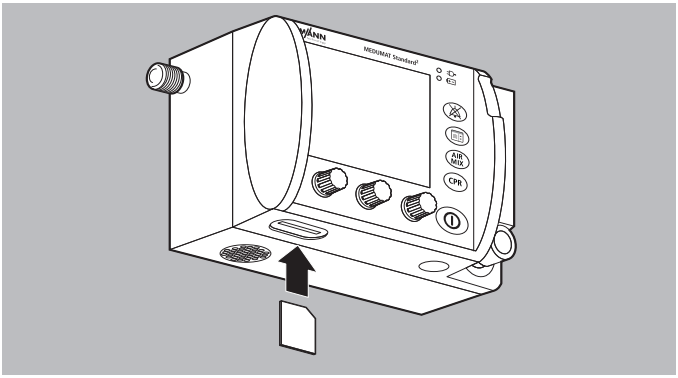
Configuration imports are saved in the log files. Configurations can only be transferred between devices with the same software version. Options subject to a charge are only imported if these options are already activated.

Inserting an SD card

NOTICE

Loss of data due to incorrect SD card!
SD cards not purchased from WEINMANN Emergency may have reduced functionality or result in the loss of data.
⇒ Only use SD cards from WEINMANN Emergency.
⇒ Do not use the SD card for third-party files.

1. Open the splash guard of the SD card slot.



2. Slide the SD card into the SD card slot until it audibly clicks into place.
   In doing so, note: The beveled corner of the SD card must be at the front on the right during insertion.
3. Close the splash guard.

Result The SD card is inserted in the device and ready for use.

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Exporting data to an SD card

Requirement

- An SD card is in the SD card slot.
- The operator menu is called up (see "5.1 Navigating the operator menu", page 66).

1. Select the menu item **Import / Export**.
2. Select the submenu item **Export log files**.

   or

   Select the submenu item **Export configuration.**

   The device automatically begins to export the desired data to the SD card.
3. Once the export has concluded: Press the navigation knob **ok** to confirm that all of the data has been correctly exported.
4. To leave the operator menu, press the navigation knob **back**.
5. Remove the SD card (see " Removing the SD card", page 74).

Result The desired data are on the SD card.

Importing a configuration onto a device

Requirement

- There must be an SD card with the desired configuration in the SD card slot.
- The operator menu is called up (see "5.1 Navigating the operator menu", page 66).

1. Select the menu item **Import / Export**.
2. Select the submenu item **Import configuration**.
   The device automatically begins to import the configuration from the SD card.
3. Once the import has concluded: Press the navigation knob **ok** to confirm that the configuration has been correctly imported.
4. To leave the operator menu, press the navigation knob **back**.
5. Remove the SD card (see " Removing the SD card", page 74).

Result The desired configuration is now on the device.

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Removing the SD card

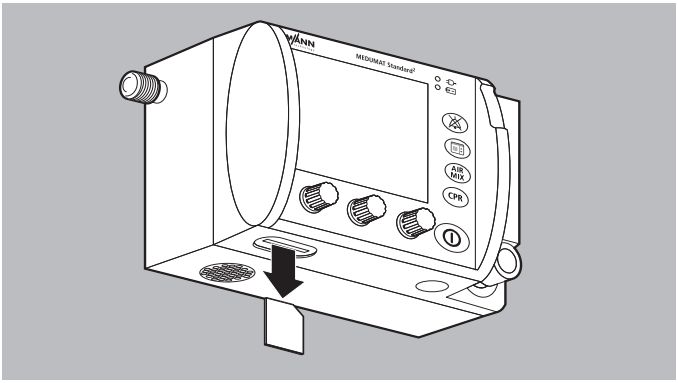
Requirement An SD card is in the SD card slot.

1. Open the splash guard of the SD card slot.

NOTICE

Incorrect use may result in loss of data or damage to the device!
If you remove the SD card whilst exporting log files or updating the software of the device, data may be lost or the device may be damaged.
⇒ Only remove the SD card after ensuring that no log file exports, or updates to the device software are in progress.

2. Briefly press in the SD card.
   The SD card is ejected slightly.



3. Remove the SD card.
4. Close the splash guard to protect the device from the ingress of moisture or an oxygen-enriched atmosphere.

Result The SD card is removed.

5.3.4 Carrying out a software update

Requirement

- The device is connected to the line power.
- A fully charged battery is inserted in the device.
- An SD card with new software is in the SD card slot.
- The operator menu has been called up (see "5.1 Navigating the operator menu", page 66).

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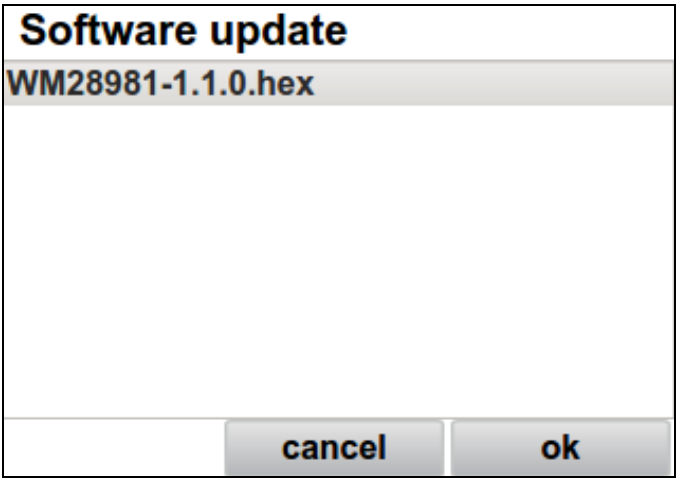
1. Select the menu item **Software update**.



2. Select Software update.

NOTICE

Damage to the device caused by moving the device and/or pressing buttons during the update!
Moving the device and/or pressing buttons during the update may cancel the update and damage the device.
⇒ Do not move the device.
⇒ Do not press any buttons on the device.

3. Press the navigation knob **ok** to update the software.
   The device updates the software.
4. After the end of the update: Press the navigation knob **reboot** to restart the device.
   The device restarts and the start menu appears on the display.
5. Perform a function check (see "8.3 Performing a function check", page 99).
6. Press and hold the On/Off button ⏻ for at least 2 seconds to switch off the device and save the settings.

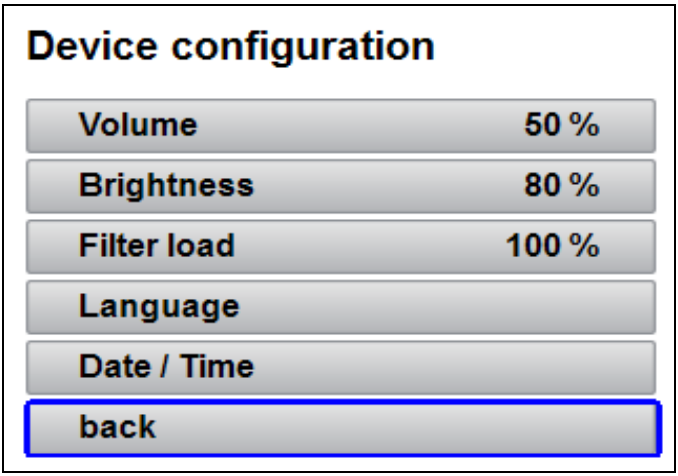
Result The software has been updated.

5.3.5 Changing the access code

5-5 Submenu for changing the access code

Here you can change the access code for the operator menu. On delivery, the access code for the operator menu is 0000.

5.3.6 Device configuration



5-6 Device configuration submenu

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In the submenu **Device configuration**, you can set the following parameters for the device:

Parameter		**Possible values**	**Description**
Volume		50% 100%	Here you can set the volume of the acoustic signals and voice prompts.
Brightness		10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	Here you can set the brightness of the display.
Filter load		100% 150% 200%	Here you can set the load caused by environmental factors (e.g., dust) for the device input filter. With an average load (100%), the filter is able to function for approx. 20 hours of ventilation in Air Mix mode.
Language	German English French Spanish Portuguese (BR) Dutch Czech Polish Russian	Deutsch English Français Español Português (Br) Nederlands Cesky Polski Русский	Here you can set the language of the display texts. Depending on the status of the device software, additional languages may be available.
Date/Time		Year Month Day Hour Minute	Here you can set the current date and time.

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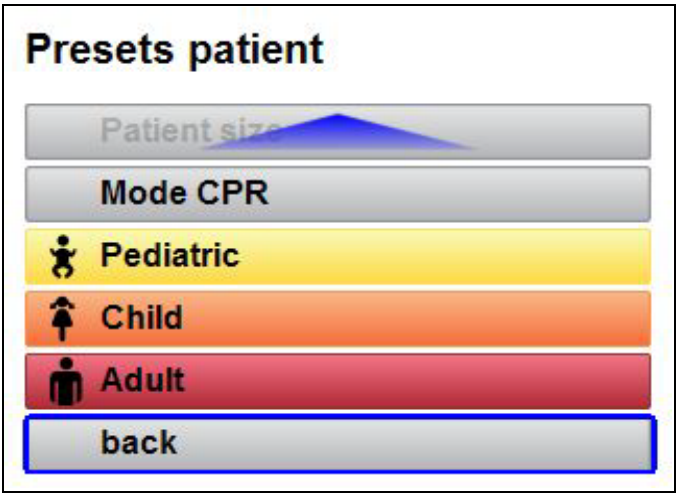
5.3.7 Presets patient



5-7 Presets patient submenu

In the **Presets patient** submenu, you can determine which presets are assigned to the ventilation parameters of the different patient groups:

Parameter		Possible values	Description
PEEP Warning		1 mbar - 21 mbar	Here you can set a limit value for the positive end-expiratory pressure. A warning is then given on the display if this value is reached or exceeded. In this case, the **PEEP** field in the bottom right of the display turns red.
Patient size*	Vt in ml per kg body weight	4 ml/kg - 10 ml/kg	Here you can set the tidal volume in milliliters per kilogram body weight. In the process, a variable is used to convert the body size to a tidal volume (see "12.2 Calculation of body weight by way of height", page 131).

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Parameter		Possible values	Description
CPR mode	Metronome		Here you can activate or deactivate the audio output of the metronome.
	CPR mode	30:2 15:2 	Here you can set the rhythm of the metronome beats in the CPR mode: • 30:2 • 15:2 •  : Continuous
	Airway pres. ↑ Alarm	☑ ☐	Here you can determine whether or not an alarm should be emitted when airway pressure increases.
	Metronome freq.	100/min - 120/min	Here you can set the frequency of the metronome tone.
	Ventilation interval	2 s 3 s 4 s 5 s 6 s	Here you can set the time interval for ventilation between the chest compressions.
Infant Child Adult	Vt	50 ml - 2000 ml, in 50 ml increments	Here you can set the tidal volume.
	Freq.	5/min - 50/min	Here you can set the frequency.
	PEEP	1 mbar - 20 mbar	Here you can set the positive end-expiratory pressure.
	P_{max}	10 mbar - 65 mbar	Here you can set the maximum inspiratory pressure.
	P_{max} CPR	10 mbar - 65 mbar	Here you can set the maximum inspiratory pressure in CPR mode.

*Setting the patient size

Depending on the patient size selected (Tidal volume Vt in ml per kg body weight) the height which can be set is restricted to the following minimum values:

Tidal volume Vt in ml per kg body weight	minimum height which can be set in cm
4	90
5	80
6	70
7	65
8	60

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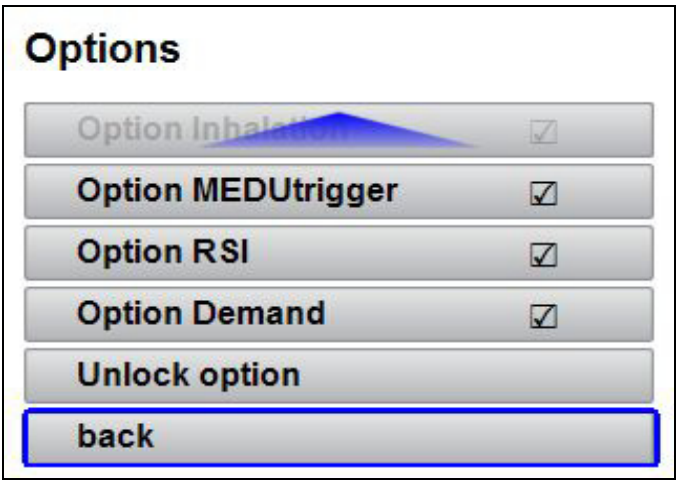
Tidal volume Vt in ml per kg body weight	minimum height which can be set in cm
9	55
10	50

For the smallest height which can be set, the tidal volume is always at least 50 ml.

5.3.8 Enabling optional functions



5-8 Options submenu

As the operator, you can enable optional functions for the user in the **Options** submenu and activate or deactivate the enabled options:

Requirement The operator menu has been called up (see "5.1 Navigating the operator menu", page 66).

1. Select the menu item **Options**.

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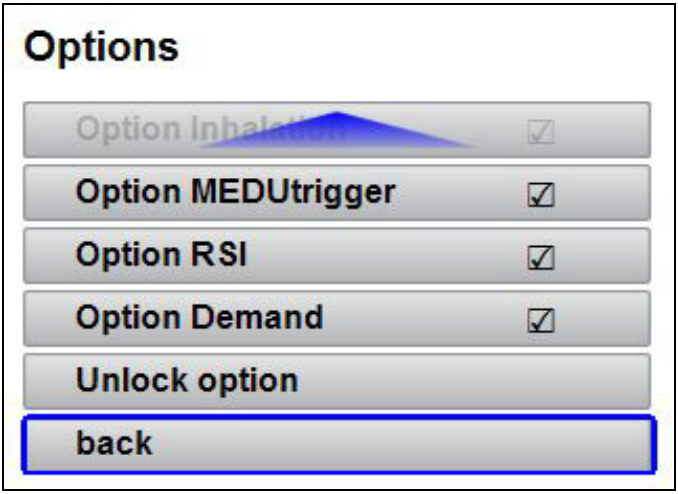
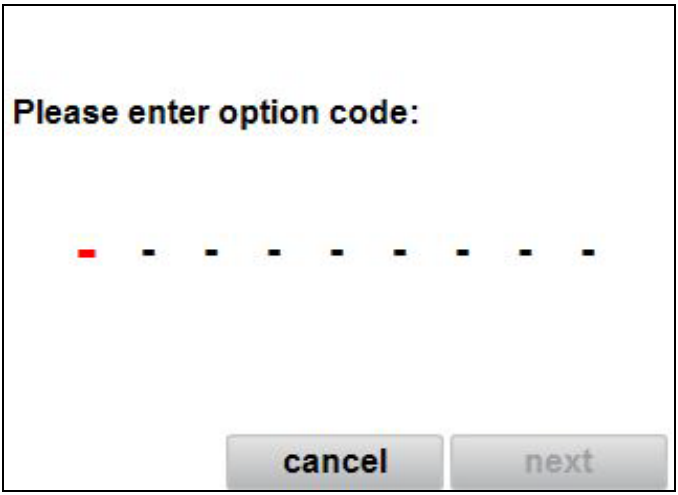


2. Select the menu item **Unlock Option**.



3. Turn the right-hand navigation knob to enter the first digit of the option code.
4. Press the navigation knob **next** to confirm the first digit of the option code.
5. Enter the other digits of the option code in the same way.

6. Press the navigation knob **ok** to confirm the option code. The optional function which has been enabled is shown on the display in the menu item **Options** on the operator menu.
7. Select the optional function.
8. Activate or deactivate the optional function using the right-hand navigation knob.
9. To leave the operator menu, press the navigation knob **back**.

Result An optional function is enabled for use, and activated or deactivated.

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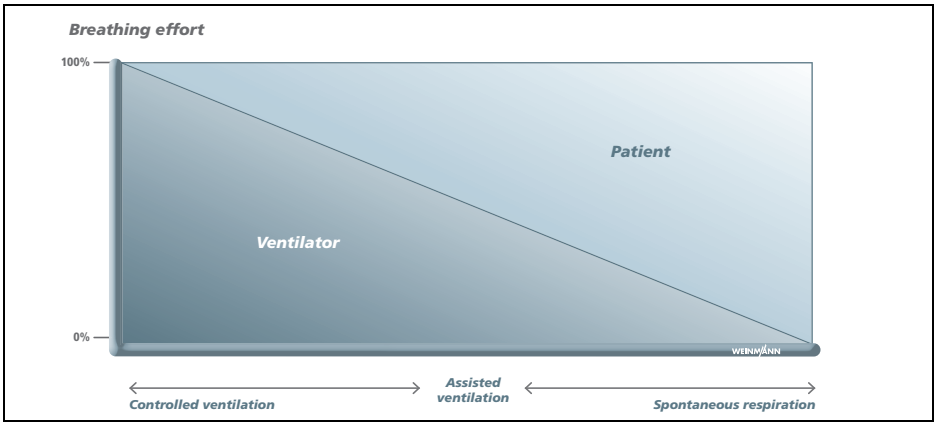
6 Description of the modes

6.1 Classification of the ventilation modes



The following ventilation modes are possible with this device:

Control parameter	Controlled ventilation	Assisted ventilation	Spontaneous respiration
Pressure			CPAP
Volume	IPPV CPR RSI-IPPV	S-IPPV SIMV RSI Manual	RSI Demand Demand

6.2 Ventilation parameters

Ventilation parameter	Unit	Description
Vt	ml	Tidal volume (breath volume)
Freq.	1/min	Ventilation rate
P_{max}	mbar	Maximum inspiratory pressure
PEEP	mbar	Positive end-expiratory pressure (CPAP)
Air Mix	-	Ventilation through the addition of ambient air
100% oxygen	-	Ventilation with 100% oxygen

With a set PEEP value > 0 mbar, the patient must create an underpressure of at least -1.3 mbar below the set PEEP value through his/her spontaneous respiratory effort in order to initiate an inspiratory trigger in the device.
If no PEEP value has been set (PEEP value = 0), the patient must create an underpressure of at least -0.8 mbar in order to initiate an inspiratory trigger. When using assisted ventilation modes, ensure that the patient shows sufficient respiratory effort. If this is not the case, the trigger sensitivity can be increased by setting a PEEP value > 2 mbar. If the patient is still not able to initiate a trigger, the mandatory rate must be set accordingly high to ensure adequate ventilation of the patient.

- When the device switches to CPR mode, the PEEP value is automatically set to 0 mbar.
- When the device switches from CPR mode to another ventilation mode, it automatically changes from the preset P_{max} value for CPR to the preset P_{max} value for all the other ventilation modes (see "5.3.7 Presets patient", page 78).

The ventilation parameters are interdependent. Example: P_{max} is always larger than the PEEP value.

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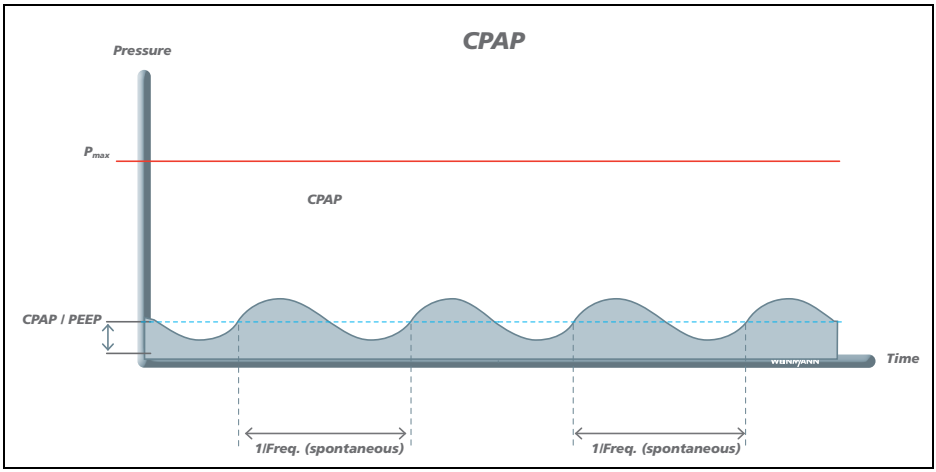
6.3 Ventilation modes

6.3.1 CPAP mode

Description	
Abbreviation	CPAP
Long form	Continuous Positive Airway Pressure
Type	Pressure-controlled
Ventilation parameters	
Left-hand navigation knob	-
Central navigation knob	-
Right-hand navigation knob	• PEEP • P_{max}

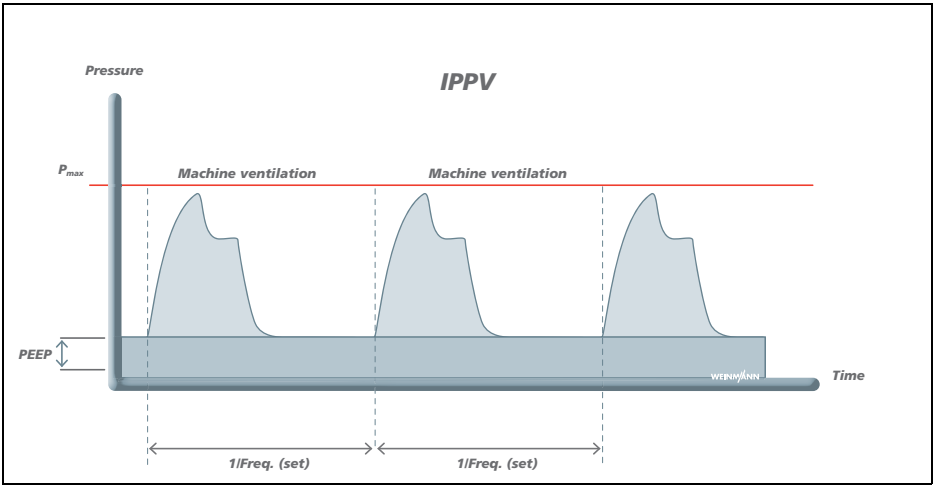


The set value CPAP/PEEP is used to increase the pressure level of respiration in order to raise the functional residual capacity (FRC) of a spontaneously breathing patient. The patient is able to breathe spontaneously without any restriction at the set pressure level. The CPAP mode is used exclusively on patients with adequate spontaneous respiration.

In principle, the pressure is set at the end of expiration (PEEP). The set maximum pressure limitation (P_{max}) ensures the safety of the patient.

6.3.2 IPPV mode

Description	
Abbreviation	IPPV
Long form	Intermittent Positive Pressure Ventilation
Type	Volume-controlled
Ventilation parameters	
Left-hand navigation knob	Vt
Central navigation knob	Freq.
Right-hand navigation knob	• PEEP • P_{max} • Emergency mode



The IPPV mode is used for mandatory volume-controlled ventilation with a fixed tidal volume. This mode is used on patients who have no spontaneous respiration. However, a spontaneously breathing patient can breathe deeply and freely during expiration. The set maximum pressure limitation (P_{max}) ensures the safety of the patient.

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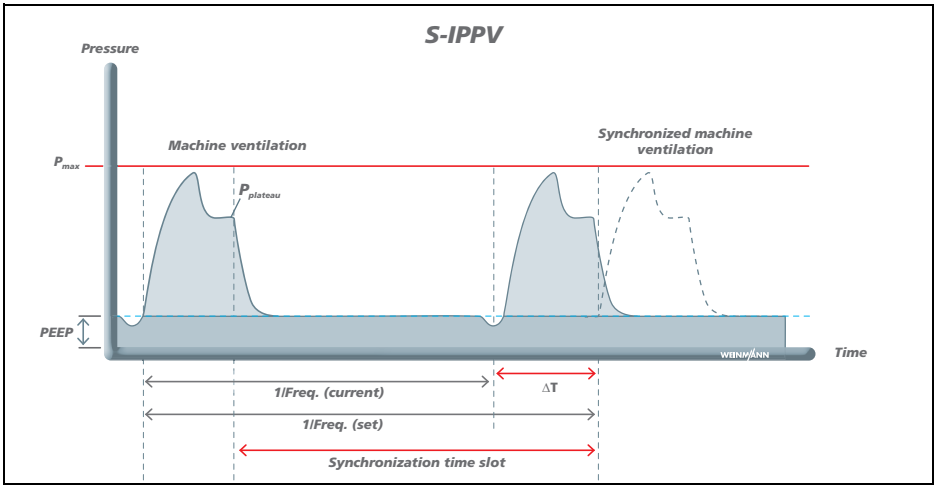
6.3.3 S-IPPV mode

Description	
Abbreviation	S-IPPV
Long form	Synchronized Intermittent Positive Pressure Ventilation
Type	Volume-controlled
Ventilation parameters	
Left-hand navigation knob	Vt
Central navigation knob	Freq.
Right-hand navigation knob	• PEEP • P_{max} • Emergency mode



⚠ WARNING

Risk of hyperventilation!
⇒ Monitor the patient continuously.

⚠ WARNING

Risk of air trapping!
⇒ Monitor the airway pressure continuously.

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⚠ WARNING

Risk of intrinsic PEEP!
An expiration that is too short can cause the pressure to increase slowly at the end of the expiration.
⇒ If the set PEEP is exceeded, the device emits a high-priority alarm (PEEP ↑).

The S-IPPV mode is used for volume-controlled ventilation with a variable mandatory minute volume. Throughout the entire expiration phase, a trigger is active which enables the patient to trigger a new breath. This means the patient has the option of increasing the respiratory rate and therefore the minute volume, and adapting these to his/her needs. As a rule this mode is used on patients who have inadequate spontaneous respiration.

Ventilation in the S-IPPV mode corresponds to ventilation in the IPPV mode with the difference that it is possible to synchronize ventilation with the patient's efforts to inhale. Since the setting for the respiratory rate is lower, the patient can trigger mandatory mechanical breaths spontaneously. A trigger time slot extending throughout the expiration time is available for this synchronization.

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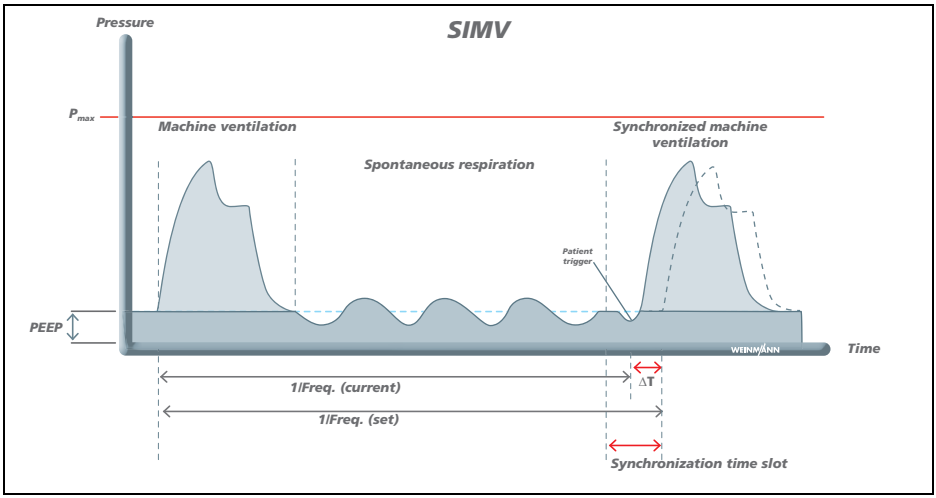
6.3.4 SIMV mode

Description	
Abbreviation	SIMV
Long form	Synchronized Intermittent Mandatory Ventilation
Type	Volume-controlled
Ventilation parameters	
Left-hand navigation knob	Vt
Central navigation knob	Freq.
Right-hand navigation knob	• PEEP • P_{max} • Emergency mode



The SIMV mode is used for volume-controlled ventilation with a fixed mandatory minute volume. The patient can breathe spontaneously between the mandatory mechanical breaths and thereby increase the minute volume. During spontaneous respiration, the mandatory mechanical breath is synchronized with the patient's breathing. The mandatory minute volume and the mandatory respiration rate remain unchanged. The set maximum pressure limitation (P_{max}) ensures the safety of the patient.

6.4 Additional functions

6.4.1 CPR mode

Description	
Abbreviation	CPR
Long form	Cardiopulmonary Resuscitation
Type	Volume-controlled
Ventilation parameters	
Left-hand navigation knob	Vt
Central navigation knob	Freq.
Right-hand navigation knob	• PEEP • P_{max} • Metronome • Rhythm

The CPR mode supports you during cardiopulmonary resuscitation (according to the Resuscitation Guidelines). MEDUMAT Standard^2 emits a metronome sound which dictates the frequency of the cardiac massage according to the algorithm 15:2 or 30:2 or continuously (in the case of intubated patients).

During the analysis of the defibrillator, you can pause continuous ventilation in order to avoid artifacts in the analysis of the defibrillator.

The MEDUtrigger supplied supports the algorithms 15:2 and 30:2. With these algorithms, 15 or 30 metronome beats are emitted in each case, of which the last five sounds have a rising tone frequency and thus announce the imminent ventilation phase. In the ventilation phase, you administer the mechanical breaths manually via the MEDUtrigger. The set maximum pressure limitation (P_{max}) ensures the safety of the patient.

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6.4.2 RSI mode

Description	
Abbreviation	RSI
Long form	Rapid Sequence Induction
Type	Volume-controlled
Ventilation parameters	
Right-hand navigation knob	• Demand • Manual • Continuous

The RSI mode supports you in the induction of anesthesia (TIVA). It is used on all patients with an increased risk of a pulmonary aspiration.

Following the selection of the RSI mode, the device launches the 100% oxygen demand function immediately for the preoxygenation of a spontaneously breathing patient.

For intubation, switch to the **Manual** function. With the MEDUtrigger supplied, this function now enables manual ventilation with a defined volume and a defined pressure limitation. The **Manual** function can be used for checking the position of the tube or as a fallback option should it prove difficult to secure the airway.

Following successful airway management, switch to a continuous ventilation mode.

6.4.3 Inhalation mode

The Inhalation mode is used for the application of a defined oxygen flow of 1-10 l/min via a corresponding interface. To connect the interface, an inhalation adapter is required, which is attached to the connection for the ventilation hose on the device. On delivery, the inhalation adapter is secured to the connection for the ventilation hose by a retaining band.

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7 Hygienic preparation

7.1 General instructions

- **This product may contain disposable items. Disposable items are intended to be used only once.** So use these items only once and do **not** reprocess them. Reprocessing disposable items may impair the functionality and safety of the product and lead to unforeseeable reactions as a result of ageing, embrittlement, wear, thermal load, the effects of chemical processes, etc.
- Wear suitable protective equipment for disinfection work.
- Please refer to the instructions for use supplied with the disinfectant used.
- Also observe the respective instructions for use of the therapy device, the components and the accessories.
- Always carry out a functional check after the hygienic preparation (see "8.3 Performing a function check", page 99).
- You can find further information about hygienic preparation and a list of all suitable cleaning agents and disinfectants in a brochure on the Internet at www.weinmann-emergency.de.
- The service life of the components of the reusable hose system is at least 30 preparation cycles.
- You can steam sterilize the measuring hose system of the reusable hose system. However, steam sterilization does not remove all bacteria. To guarantee bacteria reduction, disinfect the measuring hose system (see "7.5 Disinfecting the measuring hose system", page 96).

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7.2 Intervals

Clean the device, components and accessories after every use (but at least once a week).

7.3 Hygienic preparation of the device

⚠ WARNING

Risk of injury due to reuse of disposable items!
Disposable items are intended for single use. Disposable items which are reused may be contaminated and/or impaired in their function and therefore cause injury to the patient.
⇒ Do not reuse disposable items.

NOTICE

Damage to the device caused by ingress of liquids!
The device is rated IP54 (splash-proof). This only applies when the battery is located in the battery compartment. Ingress of liquids may damage the device, components and accessories.
⇒ Do not immerse the device, components or accessories in liquids.
⇒ Clean the battery compartment carefully so that no liquids enter the device.

1. Disconnect the device from the patient.
2. Switch off the device (see "4.6 Switching off the device", page 43).
3. If necessary: Disconnect the device from the line power.
4. Remove the battery.
5. Disconnect the patient hose system from the device.

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6. Carry out hygienic preparation of the device, components and accessories as specified in the following table:

<table>
<tr><th>Part</th><th>Cleaning</th><th>Disinfection</th><th>Thermal disinfection</th><th>Sterilization</th></tr>
<tr><td>Device</td><td rowspan="5">Wipe down with a dry or moist cloth: Use water or mild soap.</td><td rowspan="5">Wipe disinfection (Recommendation: terralin® protect)</td><td rowspan="5">Not permitted</td><td rowspan="4">Not permitted</td></tr>
<tr><td>Battery</td></tr>
<tr><td>Power supply</td></tr>
<tr><td>MEDUtrigger</td></tr>
<tr><td>Testing bag</td><td>Steam sterilize at 134°C (for a minimum of 5 mins and maximum of 18 mins with devices which comply with EN 285)</td></tr>
<tr><td>Oxygen fittings</td><td>Wipe down with a dry or moist cloth: Use clean water.</td><td>Not permitted</td><td>Not permitted</td><td>Not permitted</td></tr>
<tr><td>Reusable hose system</td><td colspan="4">See "7.4 Hygienic preparation of the reusable hose system", page 95.</td></tr>
<tr><td>Disposable hose system</td><td colspan="4">Disposable item, do not reuse</td></tr>
<tr><td>Device input filter</td><td colspan="4">Disposable item, do not reuse</td></tr>
<tr><td>Inhalation adapter</td><td colspan="4">Disposable item, do not reuse</td></tr>
<tr><td>Ventilation masks</td><td>Clean in warm water with a mild cleaning agent(1).</td><td>Use the immersion disinfection method(2) (Recommendation: gigasept® FF (new))</td><td>Rinse at up to 95°C (Recommendation: thermosept® alkaclean forte and thermosept® NKZ)</td><td>Steam sterilize at 134°C (for a minimum of 5 mins and maximum of 18 mins with devices which comply with EN 285)</td></tr>
</table>

(1) Brush the parts thoroughly inside and outside using a normal laboratory soft bottle brush.

(2) Wet all surfaces, free of bubbles, inside and outside. Allow the full exposure time to elapse. Following disinfection, rinse the parts off and out thoroughly with distilled water and allow them to dry.

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The applicable instructions are those in the instructions for use from the manufacturers of the individual components or accessories. Observe these instructions for use.

7. Connect the patient hose system up to the device.
8. Insert battery.
9. If necessary: Reconnect to line power.
10. Perform a function check (see "8.3 Performing a function check", page 99).

Result The device, components and accessories have been hygienically prepared.

7.4 Hygienic preparation of the reusable hose system

Requirement The reusable hose system has been disassembled (see "4.13.1 Disassembly of the reusable hose system", page 63).

1. Carry out hygienic preparation of the reusable hose system as specified in the following table:

<table>
<tr><th>Part</th><th>Cleaning</th><th>Disinfection</th><th>Thermal disinfection</th><th>Sterilization</th></tr>
<tr><td>Patient valve</td><td rowspan="4">Clean in warm water with a mild cleaning agent(1).</td><td rowspan="2">Use the immersion disinfection method(2) (Recommendation: gigasept® FF (new))</td><td rowspan="3">Rinse at up to 95°C (Recommendation: thermosept® alkaclean forte and thermosept® NKZ)</td><td rowspan="3">Steam sterilize at 134°C (for a minimum of 5 mins and maximum of 18 mins with devices which comply with EN 285)</td></tr>
<tr><td>Diaphragms</td></tr>
<tr><td>Ventilation hose</td><td rowspan="2">Use the immersion disinfection method(2) (Recommendation: gigasept® FF (new)) See "7.5 Disinfecting the measuring hose system", page 96.</td></tr>
<tr><td>Measuring tube system:
• PEEP control hose
• Pressure-measurement hose
• Measuring hose system connector</td></tr>
</table>

Part	Cleaning	Disinfection	Thermal disinfection	Sterilization
Hose protection sleeve	• Wipe with a damp cloth: Using water or mild soap • Wash at 30°C in the washing machine (without spinning)	• Wash at 30°C in the washing machine (without spinning, with the addition of a suitable disinfectant) • Use the immersion disinfection method (Recommendation: gigasept® FF (new))	Rinse at up to 95°C (Recommendation: thermosept® alkaclean forte and thermosept® NKZ)	Not permitted

(1) Brush the parts thoroughly inside and outside using a normal laboratory soft bottle brush.

(2) Wet all surfaces, free of bubbles, inside and outside. Allow the full exposure time to elapse. Following disinfection, rinse the parts off and out thoroughly with distilled water and allow them to dry.

2. Assemble the reusable hose system (see "4.13.2 Assembly of the reusable hose system", page 64).

Result The reusable hose system has been hygienically prepared.

7.5 Disinfecting the measuring hose system

⚠ WARNING

Risk of injury due to incorrect disinfection of the measuring hose system!
Rinsing the measuring hose system in the opposite direction to that specified does not guarantee any bacteria reduction and may injure the patient.
⇒ Only rinse the pressure-measurement hose in the specified direction.

Requirement The measuring hose system is disconnected from the patient hose system.

1. Connect a sterile disposable syringe (20 ml) to the free end of the pressure-measurement hose.

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2. Immerse the connection plug of the measuring hose system in diluted disinfection solution.
3. Draw the disinfection solution up through the pressure-measurement hose into the disposable syringe by means of suction until the syringe is completely full
(Hold time: 15 min).
4. Disconnect the disposable syringe from the pressure-measurement hose.
5. Empty the disposable syringe completely.
6. Carry out the process 6 times according to this principle.
7. Rinse the measuring hose system (pressure-measurement hose and PEEP control hose) 8 times with distilled water, according to this principle.

⚠ CAUTION

Risk of injury due to false readings!
Fluid in the measuring hose system may produce false readings and cause injury to the patient.
⇒ Allow the measuring hose system to dry out completely.

8. Allow the measuring hose system to dry out completely.
If necessary: Use sterile compressed air or medical oxygen for drying.

Result The measuring hose system has been disinfected.

i After disinfection and drying, the hose system can be sterilized.

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8 Function check

8.1 Intervals

Carry out a function check at regular intervals:

Part concerned	Interval
Device	• Before each use • After each hygienic preparation • After each repair
Patient hose system (reusable hose system)	• Before each use • After each hygienic preparation • After each disassembly • At least every 6 months

8.2 Preparing for the function check

1. Check battery status: The battery must be fully charged.
   If necessary: Charge or replace the battery.
2. Check the device for external damage.
   If necessary: Do not use the device.
3. Check the plug and cable for external damage.
   If necessary: Replace parts.
4. Check the patient hose system for external damage.
   If necessary: Replace the patient hose system.
5. Check the patient valve of the patient hose system (see "8.6 Checking the reusable hose system", page 106).
   If necessary: Replace the patient hose system.
6. Check the oxygen level in the oxygen cylinder.
   If necessary: Change the oxygen cylinder
7. Check the system for leaks (see "8.7 Checking the system for leaks", page 107).
   If necessary: Rectify any leaks in the system (see "8.8 Rectifying leaks in the system", page 107).

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8. Check the accessories for external damage.
   If necessary: Replace accessories.

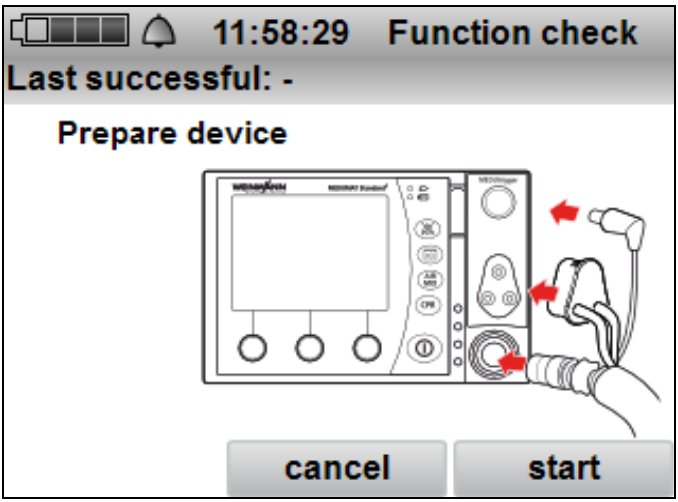
Result The function check is ready.

8.3 Performing a function check

Requirement

- The device is disconnected from the patient.
- A fully charged battery is inserted in the device.
- The device input filter is inserted in the device.
- The function check is ready.

1. Switch on the device (see "4.5 Switching on the device", page 42).
2. Select the menu item **Function check**.



3. Prepare the device:
   - Connect the patient hose system up to the device.
   - Connect the testing bag or test lung up to the patient hose system.
   - Open the oxygen cylinder.

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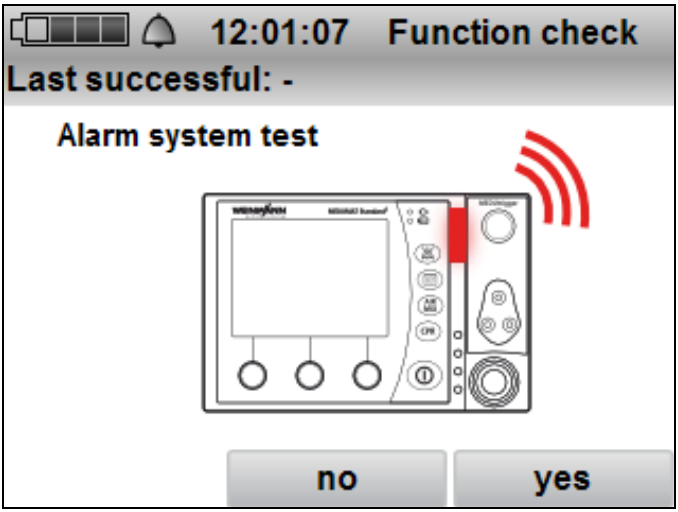
4. Press the navigation knob **start**.



5. Check the alarm system:
   - The alarm light must flash red.
   - The device must emit an audible alarm.
6. If the alarm system is functioning: Press the navigation knob **yes**.
7. If the alarm system is not functioning: Press the navigation knob **no**.

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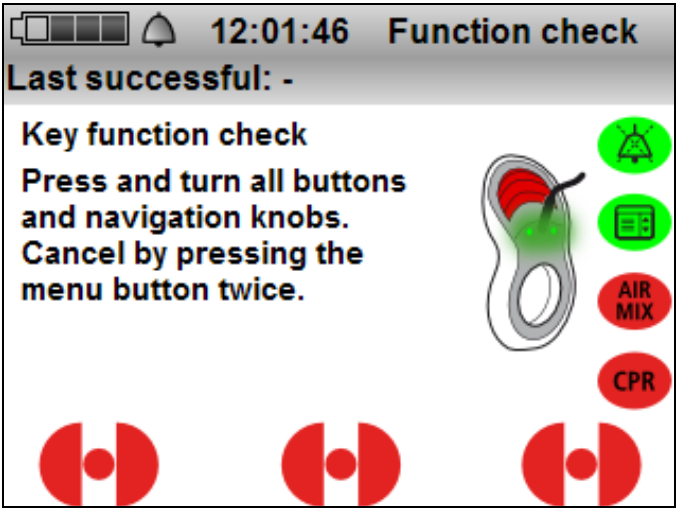
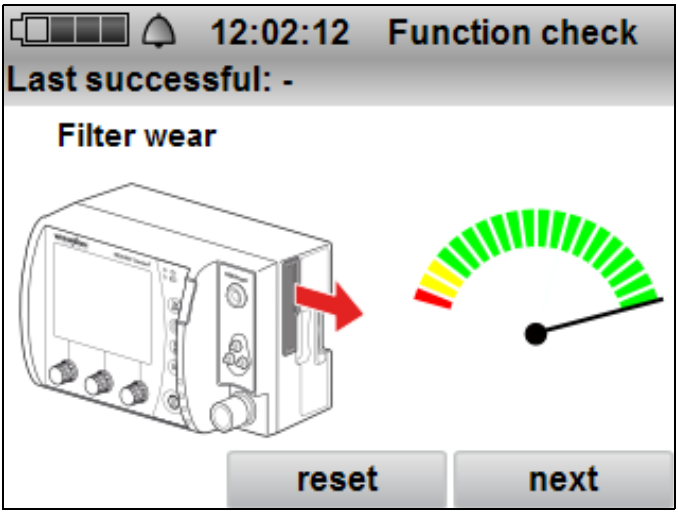


8. In the button test, press all of the controls one after the other except for the On/Off button (⏻).
9. If necessary: Press the menu button (▤) twice to cancel the button test.

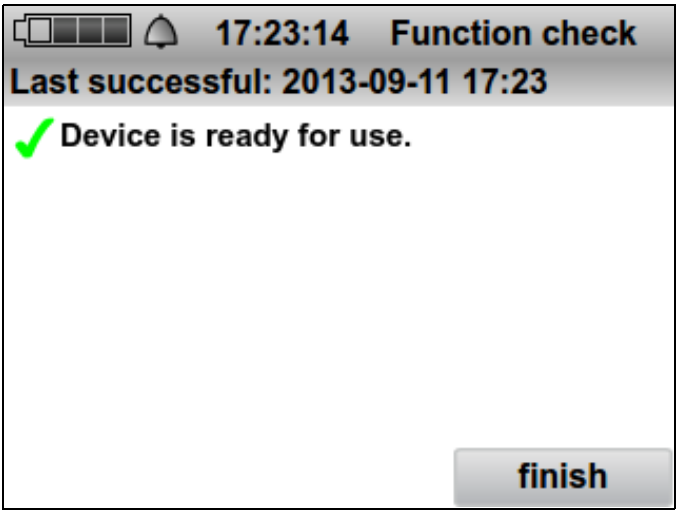


10. Proceed with the device input filter according to the following table:

Color	Action
Green	Continue to use the device input filter.
Yellow	• Keep a device input filter at the ready. **or** • Order a device input filter.
Red	Replace the device input filter.

11. When the device input filter has been replaced: Reset the filter change indicator using the navigation knob **reset**.

12. Press the navigation knob **next**.
    The status report appears.



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13. Proceed with the device according to the following table:

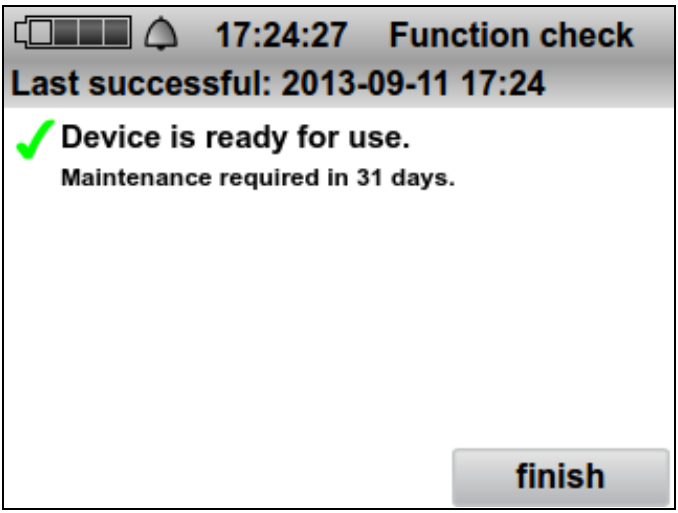
Display	Meaning	Action
✓ Device is ready for use	Function check passed.	Use device without restriction.
✓ + 🔧 Device is ready for use, + Maintenance symbol	Function check passed.	Use the device and take action (see "8.4 Successful function check with maintenance notification", page 103).
✗ Device is not ready for use	Function check failed.	Take action (see "8.5 Function check failed", page 105).

14. Press the navigation knob **finish**.

Result The function check is complete.

8.4 Successful function check with maintenance notification

Version 1 The function check is completed with **Device is ready for use** and the notification **Maintenance required in XX days**.



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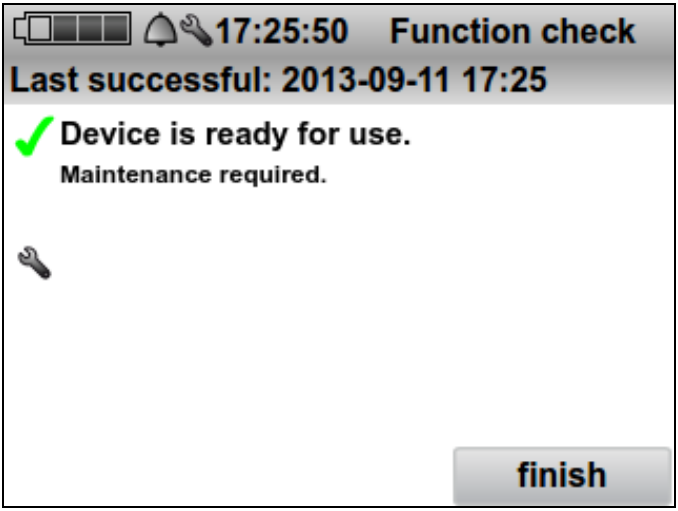
This notification begins to appear in the status report of the function check 60 days before the maintenance interval expires. Despite this notification, you can operate your device without restriction until the maintenance interval expires (see "10.2 Intervals", page 115).

Maintenance is necessary to ensure the unrestricted operation of your device. Contact WEINMANN Emergency or a service partner authorized by WEINMANN Emergency in good time to have the necessary maintenance carried out on your device.

Version 2 The function check is completed with **Device is ready for use** and the notification **Maintenance required**. In addition, the maintenance symbol flashes on the display.



This symbol appears once the maintenance interval has expired. You can continue to use your device despite this notification.

NOTICE

Risk of device malfunction or device failure in the event that maintenance interval is not adhered to!
Non-adherence to a maintenance interval may lead to a device malfunction or device failure. Wearing parts in particular are replaced as a preventive measure as part of the maintenance since the unrestricted operation of your device is otherwise not guaranteed.
⇒ Observe maintenance intervals.

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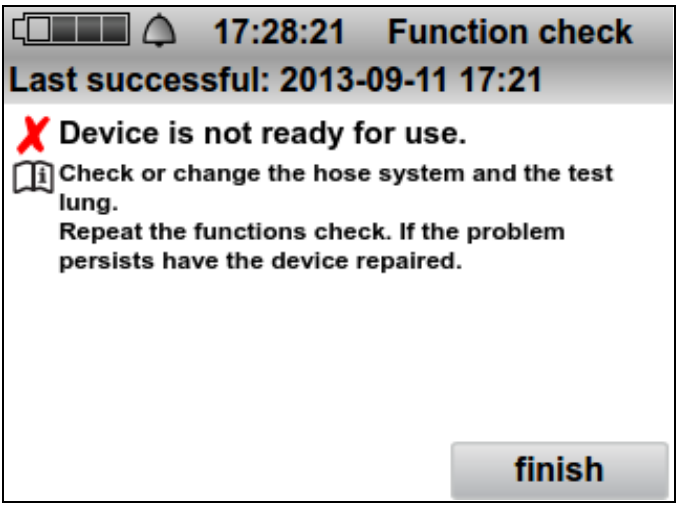
8.5 Function check failed

⚠ CAUTION

Risk of injury due to inoperational device!
Operation of the device after a failed function check may result in injury to the patient.
⇒ Only operate the device after it passes the function check.

Requirement The function check ended with **Device is not ready for use**.



1. Follow the instructions on the display.
2. Repeat the function check.
3. If the function check ends with **Device is not ready for use** again: Contact your authorized dealer or WEINMANN Emergency.

8.6 Checking the reusable hose system

Requirement The patient valve of the reusable hose system is dismounted (see "4.13.1 Disassembly of the reusable hose system", page 63).

1. Check all parts of the patient valve for external damage. If necessary: Replace damaged parts.
2. Check the PEEP control diaphragm and inspect the check valve diaphragm: If the diaphragm is torn, wavy, distorted or sticky, replace the diaphragm.
3. Assemble the reusable hose system (see "4.13.2 Assembly of the reusable hose system", page 64).

Result The patient valve of the reusable hose system has been checked and is ready for use.

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8.7 Checking the system for leaks

Requirement

- The device is connected to the oxygen supply.
- The patient hose system is connected to the device.
- The testing bag is connected to the patient hose system.

1. Open the valve of the oxygen cylinder slowly.
   The contents gauge on the pressure reducer indicates the pressure in the oxygen cylinder.
2. Close the valve on the oxygen cylinder.
3. Observe the contents gauge on the pressure reducer for approx. 1 min:
   - If the position of the needle remains constant, the system is free from leaks
   - If the needle falls, there is a leak in the system
4. If necessary: rectify the leak (see "8.8 Rectifying leaks in the system", page 107).

Result The system has been checked for leaks.

8.8 Rectifying leaks in the system

Requirement There is a leak in the system.

1. Prepare a soapy solution using unperfumed soap.

NOTICE

Damage to the device caused by ingress of liquids!
Ingress of liquids may damage the device, components and accessories.
⇒ Do not immerse the device, components or accessories in liquids.

2. Wet all screw connections and hoses with the soapy solution. Bubbles will form if a leak is present.
3. In the event of a leakage: Close the valve on the oxygen cylinder.

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4. Briefly press the On/Off button ⏻ and operate the device without an oxygen supply.
   The remaining oxygen is flushed out of the device.
5. Press and hold the On/Off button ⏻ for at least 2 seconds to switch off the device.
6. Replace leaky components.
7. Check the system for leaks once more (see "8.7 Checking the system for leaks", page 107).
8. If necessary: Look for other leaks and replace leaky components.
9. If the leak cannot be rectified, have the device repaired.

Result The leak in the system has been rectified.

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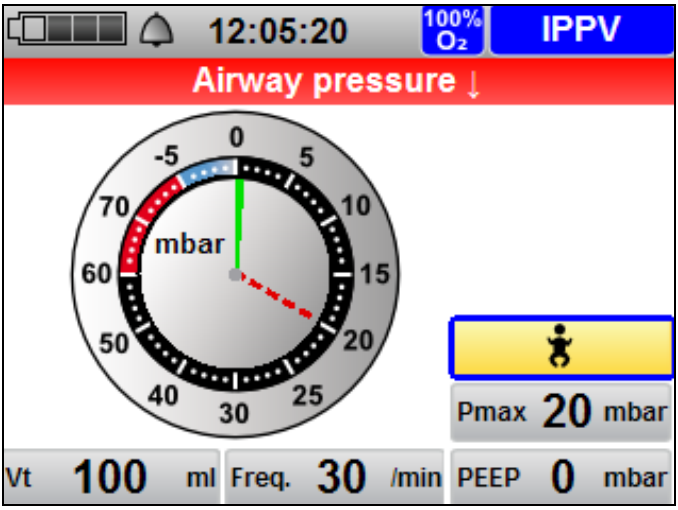
9 Alarms and error messages



Alarms are displayed in text format in the alarm line on the display. Depending on the priority of the alarm, the text is highlighted a certain color:

Alarm color	Meaning
Red	High priority
Yellow	Medium priority
Turquoise	Low priority

If more than one alarm is active, the device handles this as follows:

- Multiple alarms of different priorities: The device displays the alarm with the highest priority. Alarms with a lower priority do not appear until the higher-priority alarm is no longer active.
- Multiple alarms of identical priorities: The device displays the alarms alternately.
- Technical alarms dominate and cannot be switched off. Technical alarms occur if no ventilation using the device is possible (e.g., in the event of power failure, a supply pressure < 2.7 bar).

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9.1 Alarm messages

9.1.1 High-priority alarm (red)

Alarm	Cause	Remedy
Airway pressure ↑	Obstruction of the patient's airways	Free the patient's airways of obstructions.
	Tube wrongly positioned	Position tube correctly.
	P_{max} set too low	Adjust P_{max}.
	Hoses kinked or pinched	Route hoses so that they are not kinked or pinched.
Airway pressure ↓	Patient hose system leaking	Replace patient hose system.
	Patient hose system not connected correctly	Connect patient hose system correctly.
	Tube wrongly positioned	Position tube correctly.
	Hoses kinked or pinched	Route hoses so that they are not kinked or pinched.
	Ventilation settings incorrectly set	Adjust ventilation settings.
	Mask is not sitting correctly or is leaking	Place the mask on tightly or replace it.
Apnea	No inspiration in the last 30 s, with the exception of the CPR mode (no inspiration in the last 59 s)	Check the condition of the patient. Select mandatory ventilation.
Battery empty	Very low battery status	Replace battery (see 4.3.5, p. 37).
		Connect device to the line power (see 4.2, p. 33) and charge battery (see 4.3.2, p. 34).
Battery temperature critical	Battery temperature > 80 C	Operate battery within the permitted temperature range (see 12.1.2, p. 123).
Device malfunction/device failure	Temporary device malfunction	Switch device off (see 4.6, p. 43) and back on again (see 4.5, p. 42). Perform a function check.
	Device defective	Have the device repaired.
Device temperature ↓	Device temperature < -20°C	Operate device within permitted temperature range (see 12.1.1, p. 121).

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Alarm	Cause	Remedy
Device temperature critical	Device temperature > 75°C	Operate device within permitted temperature range (see 12.1.1, p. 121).
PEEP ↑	Obstruction of the patient's airways	Free the patient's airways of obstructions.
	Tube wrongly positioned	Position tube correctly.
	Hoses kinked or pinched	Route hoses so that they are not kinked or pinched.
	Patient valve defective	Replace patient valve.
	Ventilation settings incorrectly set	Adjust ventilation settings.
Power failure	Loss of power supply	Connect device to the line power (see 4.2, p. 33) and insert battery correctly (see 4.2, p. 33). If the device continues to display the alarm, the device restarts automatically. Otherwise, switch the device on manually (see 4.2, p. 33). In both cases, all presets are retained.
Supply pressure < 2.7 bar	Oxygen cylinder not opened	Open oxygen cylinder.
	Oxygen cylinder almost empty	Replace oxygen cylinder.
	Compressed gas source not connected correctly	Connect compressed gas source correctly.
	Compressed gas source defective	Replace compressed gas source.
	Compressed gas hose kinked or pinched	Route compressed gas hose so that it is not kinked or pinched.
	Pressure reducer defective	Replace pressure reducer.
Supply pressure > 6 bar	Pressure of compressed gas too high	Use compressed gas source < 6 bar.
		Switch device off (see 4.6, p. 43) and disconnect it from compressed gas source.

The airway pressure ↑, PEEP ↑, and airway pressure ↓ alarms are only emitted once the respective condition is satisfied in two consequent breathing cycles.

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9.1.2 Medium-priority alarm (yellow)

Alarm	Cause	Remedy
Battery defective	Battery defective or must be calibrated	Let the device run on battery power without line power until it switches off. Fully recharge battery (see 4.3.2, p. 34). If the device continues to display the alarm: Replace battery (see 4.3.5, p. 37).
Battery weak	Low battery status	Replace battery (see 4.3.5, p. 37)
		Connect device to the line power (see 4.2, p. 33) and charge battery (see 4.3.5, p. 37).
Disconnection of the MEDUtrigger	MEDUtrigger removed from the device during manual ventilation	Connect the MEDUtrigger to the device once more.
Insert battery	Battery not inserted or incorrectly inserted	Insert battery correctly (see 4.2, p. 33).
Vt not achievable	Implausible ventilation parameters	Adjust ventilation parameters.
	Compressed gas supply inadequate	Adjust compressed gas supply.
	Sintered filter blocked	Have the device repaired.

9.1.3 Low-priority alarm (turquoise)

Alarm	Cause	Remedy
Battery charging not possible	Battery temperature < 0°C or > 45°C	Charge battery within permitted temperature range (see 12.1.2, p. 123).
	Battery defective	Replace battery.
Battery operation	Line power too weak or power failure	The alarm appears: • If you remove the portable system from the wall mounting. • If you operate the device using the power supply and a power failure occurs. In both cases, the alarm stops after 10 s.

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Alarm	Cause	Remedy
Device temperature ↑	Device temperature > 65°C	Operate device within permitted temperature range (see 12.1.1, p. 121).

9.2 Error messages

If you are not able to clear an error message with the aid of the table, you should contact the manufacturer WEINMANN Emergency or your authorized dealer to have the device repaired. To avoid serious damage, do not continue using the device.

9.2.1 Device

Error message	Cause	Remedy
Alarm output too quiet	Volume set to 50%	Set the volume to 100% in the operator menu (see 5.3.6, p. 76).
Device cannot be switched off	Operating error	Hold down On/Off button ⏻ for at least 2 seconds.
Display too dark	Brightness of the display set too low	Increase brightness of the display in the operator menu (see 5.3.6, p. 76).
Red cross in function check status report	Non-functioning components	See "8.5 Function check failed", page 105.
Software update is not functioning	Update file or SD card defective	Perform software update with another SD card. If the update still cannot be performed successfully, have the device repaired.
Device cannot be switched on	Battery not correctly inserted in device or empty	Check battery.
	Battery empty and device not connected to the line power	Check power supply.
	Device defective	Have the device repaired.

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9.2.2 Battery

Error message	Cause	Remedy
Red fault indicator lights up when status button on battery is pressed or red battery status indicator on device lights up	Battery defective	Replace battery.
	Battery temperature outside the permitted range (> 70°C)	Use battery within permitted temperature range (see 12.1.2, p. 123).
Battery does not respond when status button is pressed	Battery has run down completely and has shut down to prevent deep discharge.	Charge battery (see 4.3.2, p. 34): Charging takes longer than usual. If charging is unsuccessful: Battery is over-discharged. Replace battery.
Device runtime with battery operation too short	Battery has reached end of its service life.	Replace battery.
Battery not charging although it is not full	Battery temperature < 0°C or > 45°C	Charge battery within permitted temperature range (see 12.1.2, p. 123).
	Battery defective	Replace battery.

9.2.3 Ventilation

Error message	Cause	Remedy
Unusually high oxygen consumption	Leak in oxygen feed line	Locate and rectify leak (see 8.8, p. 107).
	Patient valve does not close completely	Check hose system (PEEP control line and patient valve).
	Leakage during mask ventilation	Place mask as tightly as possible on the patient.
MEDUtrigger is not functioning	MEDUtrigger deactivated	Activate optional function MEDUtrigger in the operator menu (see 5.3.8, p. 80).

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10 Maintenance

10.1 General instructions

Maintenance, safety checks, inspections, and repairs must only be carried out by the manufacturer or a technician specifically authorized by the manufacturer.

10.2 Intervals

Part concerned	Interval	Maintenance by
Device	Maintenance and safety check every 2 years	Manufacturer or a technician specifically authorized by the manufacturer
Battery	Maintenance-free Recommendation: Replace battery after 2 years.	
Disposable hose system	Maintenance-free	
Reusable hose system	Maintenance every 2 years	User/operator (see "10.3 Maintaining the reusable hose system", page 116)
Device input filter	Following a prompt during the function check	User/operator (see "10.4 Replacing the device input filter", page 117)
Accessories (e.g., charging station)	There are individual intervals for the different accessories. Please refer to the instructions supplied with the accessories.	

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10.3 Maintaining the reusable hose system

Requirement The reusable hose system has been disassembled (see "4.13.1 Disassembly of the reusable hose system", page 63).

1. Check all parts of the reusable hose system for external damage and complete labeling.
   If necessary: Replace damaged or incorrectly labeled parts.
2. Replace the PEEP control diaphragm and check valve diaphragm (maintenance set WM 15779).
3. Assemble the reusable hose system (see "4.13.2 Assembly of the reusable hose system", page 64).
4. Punch out the date at which the next maintenance is due on the service label (maintenance set WM 15779).
5. Attach the service label to the end of the ventilation hose which is closest to the device.
6. Perform a function check (see "8.3 Performing a function check", page 99).

Result The reusable hose system has been maintained and is ready for use.

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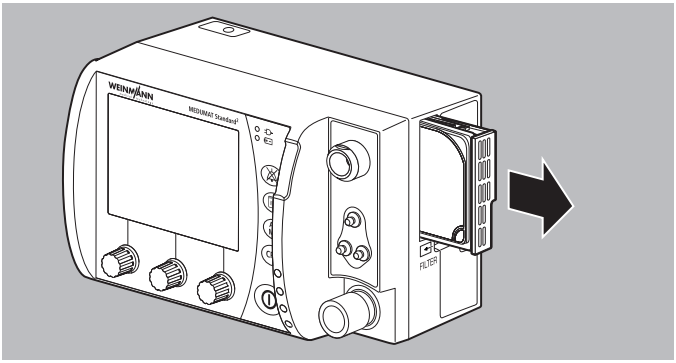
10.4 Replacing the device input filter

Requirement The device is switched off.



1. Pull the device input filter out of the filter compartment of the device.
2. Dispose of the device input filter along with the filter cassette (see "11.2.4 Device input filter", page 120).

NOTICE

Device may be damaged if a device input filter which has already been pushed together is inserted in the filter compartment!

On delivery, the filter cassette is inserted halfway into the device input filter and is fixed in its position by a transport safety device. If the filter cassette is pushed all the way into the device input filter before insertion into the filter compartment of the device, the function of the device input filter can no longer be guaranteed.

⇒ Do not alter the state of device input filters on delivery.

⇒ Do not insert the filter cassette in the device input filter single-handedly.

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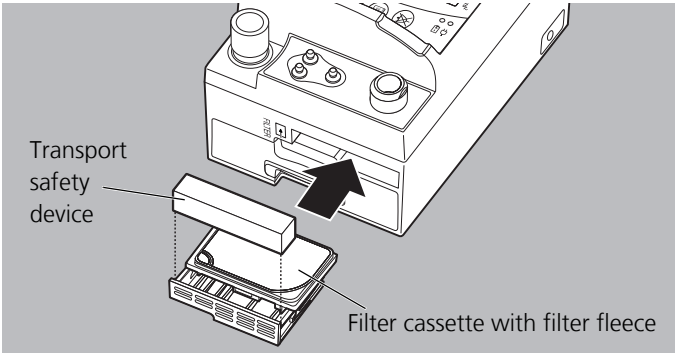

3. Remove the transport safety device from the device input filter.
4. Push the device input filter with the half-inserted filter cassette into the filter compartment of the device.
   In the process, the filter cassette is fully inserted in the device input filter.
5. Press the device input filter into the filter compartment until the device input filter audibly clicks into place and sits flush with the device.
6. Perform a function check (see "8.3 Performing a function check", page 99).

Result The device input filter has been replaced.

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11 Storage and disposal

11.1 Storage

11.1.1 General instructions

- Store the device under the prescribed ambient conditions (see "12.1 Technical data", page 121).
- If the battery is kept in storage for a prolonged period (more than a week), store it separately and recharge every 6 months.
- Following storage in extreme ambient conditions (outside of the ambient operating conditions, see "12.1.1 Technical data on device", page 121.):
  Store the device at room temperature for at least 12 hours before putting it into operation once more.
- Storing the device

1. Switch off the device (see "4.6 Switching off the device", page 43).
2. If necessary: Disconnect the device from the line power.
3. Remove the battery.
4. Clean and disinfect the device (see "7.3 Hygienic preparation of the device", page 93).
5. Store the device and battery in a dry place.

Result The device and battery are stored in a dry place.

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11.2 Disposal

11.2.1 Electronic waste

Do not dispose of the product in the household waste. Consult an authorized, certified electronic waste recycling company for proper disposal. You can find out their address from your environmental officer or from your local council.
The device packaging (cardboard box and inserts) can be disposed of as waste paper.

The following products are categorized as electronic waste:

- Device
- Power supply

11.2.2 Battery

Do not dispose of used batteries in the household waste. Contact WEINMANN Emergency or a public waste disposal authority.

11.2.3 Patient hose system

After use, dispose of the patient hose system in the correct manner for plastics.

11.2.4 Device input filter

Dispose of the device input filter and filter cassette in the household waste.

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12 Appendix

12.1 Technical data

12.1.1 Technical data on device

Specification	Device
Product class according to Directive 93/42/EEC	IIb
Dimensions (W x H x D)	206 mm x 137 mm x 130 mm
Weight: Without battery With battery	 Approx. 2 kg Approx. 2.5 kg
Operation: Temperature range Humidity Air pressure Altitude above sea level	 -18°C to +50°C 0% RH to 95% RH without condensation 540 hPa to 1100 hPa -500 m to 5000 m
Storage/Transport: Temperature range Humidity	 -40°C to +70°C (max. 48 h) 0% RH to 95% RH without condensation
Electrical connection (rated voltage)	12 V to 15 V
Max. power consumption	30 W
Current consumption	0.1 to 3 A
Operating time with battery	6 h
Vehicle electrical system operation: Rated voltage Max. internal resistance of vehicle electrical system	 12 V 500 mΩ
Line operation Rated voltage	 15 V
Disconnection from line power	Pulling out the power plug disconnects the device from line power on all poles.
Operating mode	Continuous operation
Classification acc. to EN 60601-1: • Type of protection against electric shock • Degree of protection against electric shock	 Protection class II BF-type protection

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Specification	Device
Degree of protection against: • ingress of solid objects • ingress of dust • ingress of water with harmful effect	IP54
Electromagnetic compatibility (EMC) as per EN 60601-1-2: Radio interference suppression Radio interference immunity	Test parameters and limit values can be requested from the manufacturer (WEINMANN Emergency Medical Technology GmbH + Co. KG, Frohboesestrasse 12, 22525 Hamburg, Germany) if required. EN 55011 EN 61000-4 (parts 2 to 6, 8 and 11) RTCA DO 160 G
Display	5" TFT color display Resolution: 320 pixels x 240 pixels
Alarm volume	60 dBA to 88 dBA
Standards used	EN 60601-1 EN 1789 EN 794-3 ISO 10651-3 RTCA DO-160 G
Control of ventilation modes: • Volume-controlled • Pressure-controlled	 IPPV, CPR, SIMV (optional), S-IPPV (optional), RSI, Inhalation (optional) CPAP
Inhalation	0 l/min to 10 l/min, in increments of 1 l/min
Operating gas	Medical oxygen
Operating pressure range	2.7 bar to 6 bar
Recommended gas supply	4.5 bar (static) 2.7 bar at 80 l/min
Maximum outlet flow	At least 80 l/min with an input pressure of 4.5 bar in Air Mix and Non-Air Mix mode
I:E	1:1.7 mandatory, otherwise trigger-dependent (±10%)
Ventilation rate	5 min^{-1} to 50 min^{-1} (±1 min^{-1})
Inspiration time	At least 0.45 s Max. 4.5 s
Tidal volume	50 ml to 2000 ml (±40 ml or ±20%)
Respiratory minute volume	At least 0.25 l Max. 20 l
Pressure limitation (P_{max})	10 mbar to 65 mbar (±3 mbar or ±15%)
Mechanical safety valve	Pressure limitation to a maximum of 100 mbar
PEEP	0 mbar to 20 mbar (±3 mbar or ±15%)

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Specification	Device
Trigger	Inspiratory trigger: -1.3 mbar at PEEP > 0 -0.8 mbar at PEEP = 0 Expiratory trigger: 30% of the maximal flow
Oxygen concentration: • Air Mix mode • Non-Air Mix mode	 See "12.1.6 Oxygen concentration in Air Mix mode", page 129. 100% O_2
Pressurized gas thread	External thread G 3/8
Ventilation hose connection	WEINMANN Emergency-specific
Patient valve connections	WEINMANN Emergency-specific
Service life of the device input filter	24 h in Air Mix mode or 6 months

CE 0197 Subject to alterations in design.

12.1.2 Technical data on rechargeable battery

Specification	Battery
Type	Li-ion
Dimensions (W x H x D)	97 mm x 127 mm x 33 mm
Weight	450 g
Rated capacity	4.3 Ah (≥ 46.4 Wh)
Rated voltage	10.8 V
Charging time (0% to 95%)	3.5 h
Charging temperature	0°C to +45°C
Temperature range for operation	-18°C to +50°C
Transport/Storage: Temperature range Humidity	 -30°C to +70°C (max. one week at more than +60°C) 0% RH to 95% RH without condensation
Life	At least 300 charging cycles

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12.1.3 Technical data on patient hose system

Specification	**Patient hose system Length 2 m**		**Patient hose system Length 3 m**	
Operation: • Temperature range • Relative humidity	-18°C to +50°C 15% to 95%			
Product class according to Directive 93/42/EEC	IIa			
Storage: • Temperature range • Relative humidity	-30°C to +70°C Maximum of 95%			
Patient valve: Patient connection for mask/ endotracheal tube	15 mm internal taper 22 mm external taper EN ISO 5356-1			
Patient valve: Expiration opening	Non-connectable expiration opening			
Compliance: • Reusable hose system • Disposable hose system	0.79 ml/hPa (ml/cmH_2O) 0.90 ml/hPa (ml/cmH_2O)		1.11 ml/hPa (ml/cmH_2O) 1.26 ml/hPa (ml/cmH_2O)	
Internal volume of the complete respiratory system: • Reusable hose system • Disposable hose system	Approx. 573 ml Approx. 573 ml		Approx. 857 ml Approx. 857 ml	
Dead space: • Patient valve (reusable hose system) • Patient valve (disposable hose system)	Without elbow: Approx. 16 ml Approx. 12 ml	With elbow: Approx. 28 ml Approx. 21 ml	Without elbow: Approx. 16 ml Approx. 12 ml	With elbow: Approx. 28 ml Approx. 21 ml
Materials used	PC, silicone, TPE, PA, polyolefin, PP, TPR, PE, PU, polyisoprene			

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Pressure drop [hPa] over the inspiratory and expiratory flow path at different flow rates [l/min] as per EN 794-3 (in combination with MEDUMAT Standard^2, measuring point 1: patient connection opening)						
	Flow [l/min]	**Patient hose system (reusable), 2 m**		**Patient hose system (disposable), 2 m**		**Patient hose system (disposable), 2 m, with reduced dead space**
		With elbow	**Without elbow**	**With elbow**	**Without elbow**	**With elbow**
Spontaneous respiration in the event of power failure, inspiratory (STP)(1)	2.5	0.35	0.26	0.23	0.10	0.13
	15	1.35	1.08	0.15	0.50	1.18
	30	2.82	2.72	2.93	1.30	3.27
Spontaneous respiration in the event of power failure, expiratory (BTPS)(2)	2.5	0.62	0.66	1.17	0.60	0.75
	15	1.52	1.53	1.99	1.00	1.82
	30	2.05	2.00	2.60	1.20	3.26
Normal operation, inspiratory (STP)(1)	5	0.00	0.00	0.10	0.00	0.00
	30	0.13	0.00	0.26	0.10	0.12
	60	0.34	0.14	0.93	0.20	0.27
Normal operation, expiratory (BTPS)(2)	5	0.85	0.92	1.41	0.70	0.96
	30	2.01	2.01	2.58	1.20	3.24
	60	2.80	2.59	3.67	1.70	7.28

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Pressure drop [hPa] over the inspiratory and expiratory flow path at different flow rates [l/min] as per EN 794-3 (in combination with MEDUMAT Standard^2, measuring point 1: patient connection opening)					
	Flow [l/min]	**Patient hose system (reusable), 3 m**		**Patient hose system (disposable), 3 m**	
		With elbow	**Without elbow**	**With elbow**	**Without elbow**
Spontaneous respiration in the event of power failure, inspiratory (STP)(1)	2.5	0.35	0.32	0.26	0.27
	15	1.25	1.19	1.23	1.18
	30	2.75	2.68	2.96	2.81
Spontaneous respiration in the event of power failure, expiratory (BTPS)(2)	2.5	0.54	0.83	1.30	1.15
	15	1.29	1.35	2.03	1.85
	30	1.75	1.75	2.63	2.38
Normal operation, inspiratory (STP)(1)	5	0.00	0.00	0.00	0.00
	30	0.15	0.12	0.18	0.10
	60	0.40	0.15	0.76	0.21
Normal operation, expiratory (BTPS)(2)	5	0.80	1.05	1.50	1.33
	30	1.75	1.72	2.60	2.36
	60	2.39	2.29	3.86	3.27

(1) STP (Standard Temperature and Pressure): volume at 21°C and 1013 hPa

(2) BTPS (Body Temperature and Pressure, saturated): volume at current ambient pressure and 37°C, with 100% saturated gas

Attainable tidal volume with counterpressure				
Counterpressure (mbar)	**Deviation of tidal volume (ml)**			
	Patient hose system 2 m		**Patient hose system 3 m**	
	Reusable	**Disposable**	**Reusable**	**Disposable**
0	0	0	0	0
5	-3.95	-4.5	-5.55	-6.3
15	-11.85	-13.5	-16.65	-18.9
30	-23.7	-27	-33.3	-37.8
60	-47.4	-54	-66.6	-75.6

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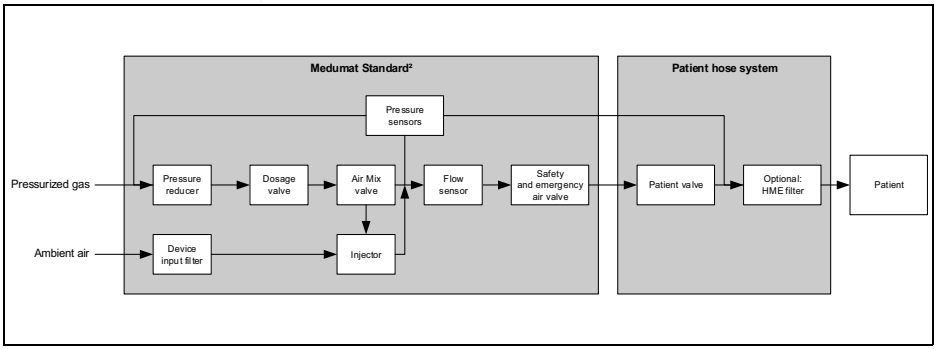
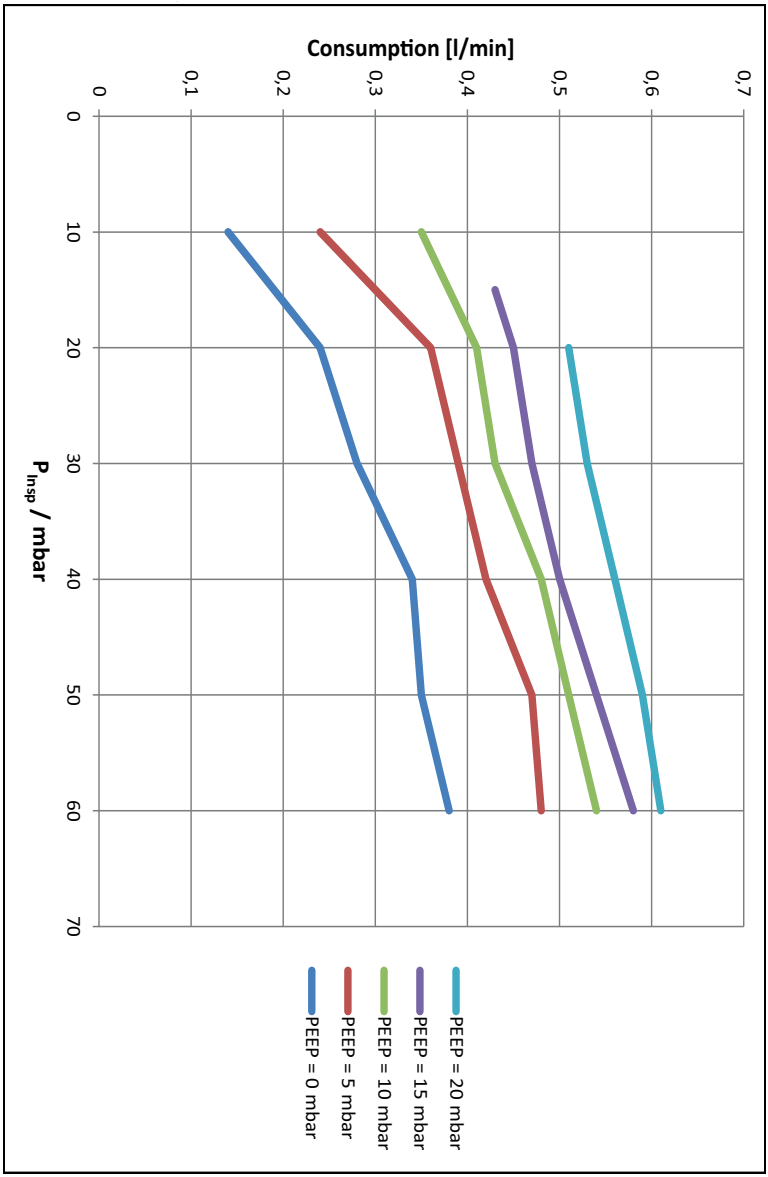
12.1.4 Block diagram



12.1.5 O_2 consumption of the device



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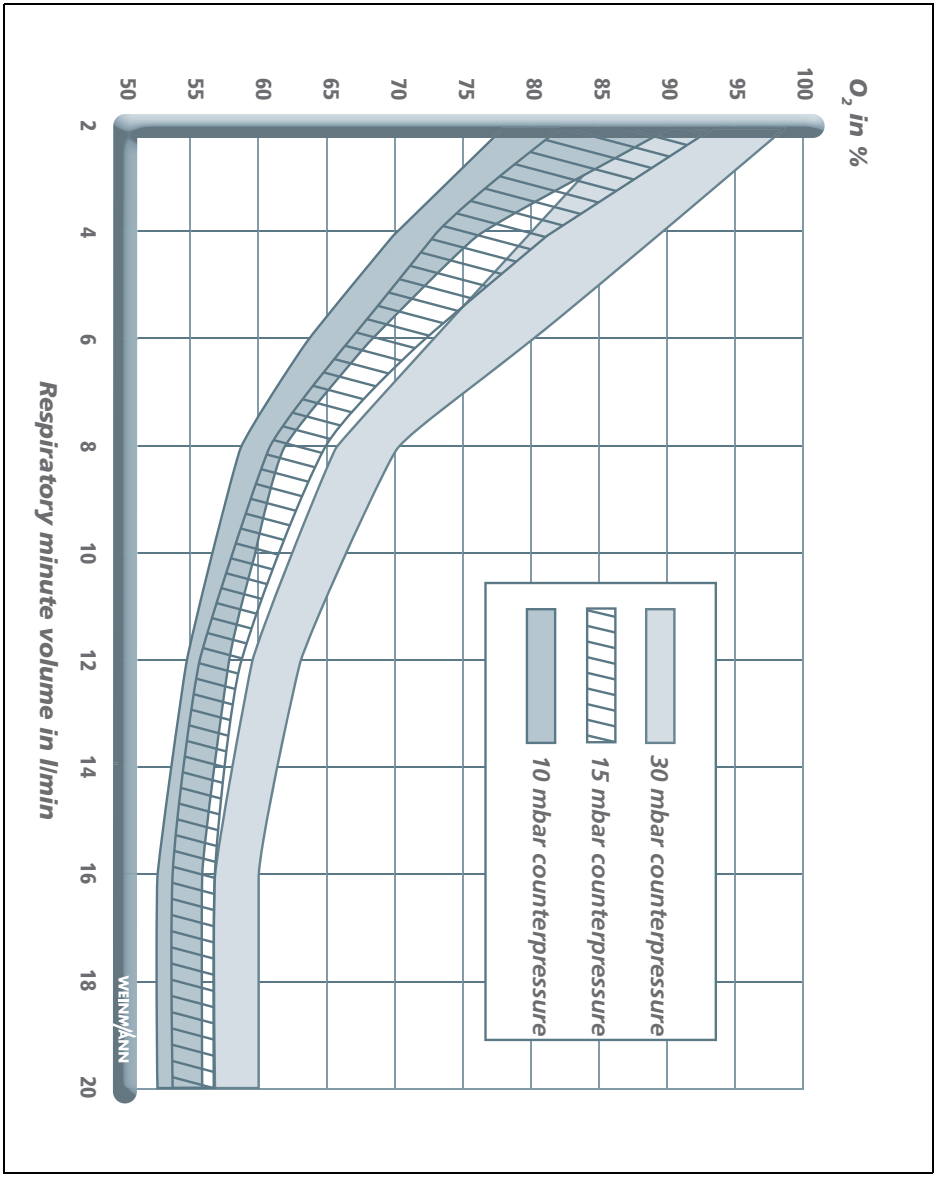
12.1.6 Oxygen concentration in Air Mix mode

The following diagram shows the oxygen concentration for Air Mix mode at different counterpressures and respiratory minute volumes.



12.1.7 Technical data on electromagnetic compatibility (EMC)

Medical electrical equipment is subject to special precautions in relation to electromagnetic compatibility (EMC). It must be installed and put into operation in accordance with the EMC information contained in the accompanying documentation.

Separation distances

Recommended separation distances between portable and mobile RF communications equipment and the MEDUMAT Standard²				
The MEDUMAT Standard² is intended for use in an electromagnetic environment in which the radiated RF disturbances are controlled. The customer or user of the MEDUMAT Standard² can avoid electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and the MEDUMAT Standard² (as recommended below, according to the maximum output power of the communications equipment).				
Rated maximum output power of the RF device in W	**Separation distance according to frequency of transmitter in m**			
	150 kHz-80 MHz	**150 MHz-800 MHz in the ISM bands**	**80 MHz-800 MHz**	**800 MHz-2.5 GHz**
0.01	0.12	0.12	0.04	0.08
0.1	0.38	0.38	0.13	0.24
1	1.2	1.2	0.4	0.77
10	3.8	3.8	1.3	2.4
100	12	12	4	7.7

12.1.8 Factory settings for emergency modes

Ventilation parameter	**Adult**	**Child**	**Pediatric**
Vt	600 ml	200 ml	100 ml
Frequency	12/min	20/min	30/min
PEEP	0 hPa	0 hPa	0 hPa
P_{max}	30 hPa	25 hPa	20 hPa

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12.2 Calculation of body weight by way of height

In the start menu, you can set the height of the patient under the menu item **New patient** (see "4.7.3 Selecting a ventilation mode for a new patient", page 46). The device calculates the matching ventilation parameters based on the set height and the corresponding ideal body weight (IBW).

The IBW value is calculated as follows:

- Child[1] (height ≤ 154 cm):

⇒ IBW = 2.05 x $e^{0.02 \text{ x height}}$

- Adult[2] (height > 154 cm):

⇒ IBW, male = 50 + 2.3 x [height/2.54 - 60]
⇒ IBW, female = 45 + 2.3 x [height/2.54 - 60]

With the aid of the IBW, the tidal volume can be calculated as follows:

$$\text{IBW} \times \frac{Vt}{kg\ KG}$$

(KG = body weight)

Example

- Patient, male, height 185 cm
- Setting for Vt/kg KG = 6 ml/kg

⇒ IBW = 50 + 2.3 x [185 cm/2.54 - 60] = 79.51 kg ≈ 80 kg

⇒ Vt = 80 kg x 6 ml/kg = 450 ml

[1] Source: TRAUB, S.L.; JOHNSON, C.E.: Comparison of methods of estimating creatinine clearance in children. In: American journal of hospital pharmacy 37, 1980, No.2, pp. 195–201
[2] Source: DEVINE, Ben J. Gentamicin therapy. The Annals of Pharmacotherapy, 1974, Vol. 8, No. 11, pp. 650-655

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12.3 Exported log files

If you have exported log files to an SD card (see "5.3.3 Import/ export", page 71), you will find the following files on the SD card:

File name	Description
debug	Supports communication in the event of servicing.
status	Supports communication in the event of servicing.
fcheck	Record of the function checks which have been performed (see 12.3.1, p. 132).
update	Record of a software update which has been performed (see 12.3.2, p. 133).

12.3.1 Recorded function checks

In the file **fcheck**, the function checks which have been performed are saved along with the date, time and their results. This information helps you with documentation within the scope of your quality management system. You can open the file **fcheck** with a spreadsheet program (e.g., Microsoft Excel®). Below you will find an example of a readout from an **fcheck** file:

#date	time	sequence	uid	fcheck	result*	alarm-system	buttontest	temperature	pressure	flow	bleeding	tightness	input-pressure	airmix
28. 01. 2013	15:28: 42	14	6001	fcheck	**failed**	ok	ok	ok	ok	ok	ok	failed	ok	ok
30. 01. 2013	10:29: 03	16	6000	fcheck	**ok**	ok	ok	ok	ok	ok	ok	ok	ok	ok

*In the column **result**, you will find the result of a function check (**ok** = passed, **failed** = not passed). If a function check has been failed, the cause of the failure is indicated by the appearance of the word **failed** in the columns which follow. In the example given, the function check was failed due to a leak (**tightness** column).

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Column name	Description
#date	Date of the function check
time	Time of the function check
sequence	Consecutive application number
uid	For service purposes only
fcheck	For service purposes only
result	Result of the function check
alarmsystem	Test of the visual and audible alarms
buttontest	Test of the buttons and navigation knobs
temperature	Check of the internal temperature of the device
pressure	Check of the internal pressure sensors
flow	Check of the internal flow sensor
bleeding	Check of the pneumatic bleed time
tightness	Check of the tightness of the device including the patient hose system
inputpressure	Check of the input pressure sensor
airmix	Check of Air Mix mode

12.3.2 Recorded software updates

In the file **update**, the software updates which have been performed are saved. This information helps you with documentation within the scope of your quality management system. You can open the file **update** with a word processing program. The following information can be found in the file:

```
Softwareupdate durchgeführt / software update performed:
Datum / date: 2013-06-24 15:59:38
Seriennummer / serial number: 109
Updatedatei / update file: xxxxx.hex


Unterschrift / signature:




Softwareupdate durchgeführt / software update performed:
Datum / date: 2013-07-10 18:20:10
Seriennummer / serial number: 109
Updatedatei / update file: xxxxx.hex


Unterschrift / signature:
```

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12.4 Scope of supply

12.4.1 Standard product

MEDUMAT Standard^2 with MEDUtrigger WM 28700-01-000

Part	Article number
Basic device with MEDUtrigger socket	WM 28710-01
Basic patient hose system, 2 m, reusable	WM 28860
Battery	WM 45045
MEDUtrigger 2 m	WM 28992
Testing bag for MEDUMAT	WM 1454
Set of CPAP/NIV disposable masks with air cushion	WM 15807
Ventilation mask with self-inflating silicone cushion for adults, size 5	WM 5074
Device input filter	WM 28745
Medical device logbook	WM 16430
Delivery record	WM 16318
MEDUMAT Standard^2 Instructions for Use	WM 68011

12.4.2 Accessories

Accessories can be ordered separately, if required. A current list of accessories is available on the Internet at www.weinmann-emergency.de or from your authorized dealer.

Part	Article number
MEDUtrigger 3 m	WM 28993
Charging adapter	WM 28979
50 W power supply	WM 28305
100 W power supply	WM 28937
12 V cable	WM 28356
Charging station	WM 45190
EasyLung for WEINMANN Emergency	WM 28625
SD card	WM 29791
T-distributor with self-sealing coupling	WM 22395

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Part	Article number
Set, holding plate for equipment rail	WM 15845
Set, wall holder for power supply unit and charger	WM 15846
Set, wall holder for rechargeable battery pack	WM 15847
Hospital standard rail attachment set	WM 15795
Rail bracket attachment set	WM 15806
Basic patient hose system, 2 m, disposable	WM 28865
Basic patient hose system, 3 m, reusable	WM 28861
Basic patient hose system, 3 m, disposable	WM 28866
Basic patient hose system, 2 m, disposable, with reduced dead space	WM 28867
Breathing system filter for MEDUMAT ventilators	WM 22162
Inhalation adapter	WM 28263
AD22 protective cap	WM 28942
2 l oxygen cylinder, full, G 3/4, max. filling pressure 200 bar	WM 1822
2 l lightweight oxygen cylinder, full, G 3/4, max. filling pressure 200 bar	WM 1814
Pressure reducer OXYWAY Fix III, G 3/4	WM 30301
Pressure reducer OXYWAY Fast II High Flow, G 3/4	WM 31891
Pressure hose, 10 bar, with connection nozzle G 3/8; at the other end, the option of a union nut G 3/8 or oxygen supply connector	Article number on request

12.4.3 Spare parts

Replacement parts can be ordered separately, if required. A current list of replacement parts is available on the Internet at www.weinmann-emergency.de or from your authorized dealer.

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12.5 Warranty

Starting from the date of purchase, WEINMANN Emergency offers the customer a limited manufacturer's warranty on a new original WEINMANN Emergency product or replacement parts installed by WEINMANN Emergency in accordance with applicable warranty terms and conditions for the particular product and the warranty periods listed below. The warranty terms and conditions are available on the Internet at www.weinmann-emergency.de. On request, we will send you the warranty terms and conditions by mail.
If you wish to make a warranty claim, consult your authorized dealer.

Product	**Warranty periods**
WEINMANN Emergency devices, incl. accessories (excluding: masks), for oxygen therapy, and emergency medicine	2 years
Masks, incl. accessories, batteries (unless otherwise stated in the technical documentation), sensors, hose systems	6 months
Disposable products	None

12.6 Declaration of Conformity

WEINMANN Emergency Medical Technology GmbH & Co. KG declares herewith that the product complies fully with the respective regulations of the Medical Device Directive 93/42/EEC. The unabridged text of the Declaration of Conformity can be found on our website at www.weinmann-emergency.de

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